經濟的

The Japanese

素晴らしい

have a word for it*

驚異的

* ACTUALLY THREE WORDS —English words. One is *great!* Another is *remarkable!* But the most important one: *economical!*

That is how the Japanese who have used it describe USS "T-1" Steel. What they learned about this unique constructional alloy steel is of value to men who design, maintain, or repair factories and the equipment in them.

The Japanese used this exceptionally strong alloy steel to save over 1720 tons of steel in four new, giant pressure vessels in Tokyo. It permitted them to use thinner wall sections safely . . . to build the vessels larger . . . to supply their natural-gas storage requirements with fewer vessels than would have been possible with structural carbon steel.

USS "T-1" Steel's unusually high yield strength (90,000 psi minimum) and its great toughness and resistance to brittle failure made the weight reduction possible. Its ready weldability made it possible to fabricate vessels 110.5 feet in diameter in the field without heat treatment.

What is the significance of all this? Just this: USS "T-1" Steel can add strength . . . or take off weight . . . or improve durability . . . or simplify fabrication . . . or cut the original cost and reduce maintenance of such varied equipment as lift trucks, cranes, hoppers, conveyors, roof trusses, machine foundations, press frames, ductwork, flywheels, jigs, and storage vessels.

Write for our new booklet titled "T-1." United States Steel, Room 5632, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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See The United States Steel Hour. It's a full-hour TV program presented every other Wednesday by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL

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with the editors in field and office

Edited by R. L. Marinello

Plastics Exposition

Eighth National Plastics Exposition will be held from November 17 through the 21 in Chicago, Illinois, at the International Amphitheatre. At the same time, a National Plastics Conference will be held in Chicago at the Hotel Morrison. Further information about the conference or exposition may be obtained from L. P. Williams, The Society of the Plastics Industry, Inc., 250 Park Avenue, New York 17, N. Y.

Conference on Adhesives and Sealants

EVERY KIND of adhesive and sealant material used in construction will be identified, the nature of its use explained and specific applications reported at the Building Research Institute meeting in the Shoreham Hotel, Washington, D. C., December 4 and 5.

Sessions on the first day will discuss the types of adhesives, sealing compounds and tapes along with talks on Sealing Joints in the Building Exterior; Adhesives for the Building Interior; and Adhesives for Walls, Ceilings and Work Surfaces.

The second-day program will treat the adhesives and sealants used for structural materials, assemblies and pre-assembled units. A session on the future of adhesives and sealants and a conference round-up talk will complete the meeting.

Registration forms and further information may be obtained from Harold Horowitz, Technical Secretary, Building Research Institute, 2101 Constitution Ave., Washington 25, D. C.

Report on Dry Film Lubricants

SOME DRY FILM lubricants have high pressure and anti-wear properties as good as or better than extreme pressure oils, according to a report of tests conducted by the Air Force.

The investigation indicated that the most successful types of dry film lubricants have excellent properties for plain bearing applications at low speeds. The dry-friction reducing films were tested for endurance and load-carrying capacity. Materials studied were commercial baked resin-bonded films and spray can coatings with graphite or molybdenum disulfide, experimental baked resin-bonded films with molybdenum disulfide and a variety of resin bases, and air-drying coatings applied by dipping.

Among the results, it was shown that the life and load-carrying ability of dry film lubricants is dependent on the resin bonding agent used and the pre-treatment given the metal surface.

The report, PB 121922, Evaluation of Dry-Film Lubricant Coatings, Part I, by W. C. Hart, Wright Air Development Center, U. S. Air Force, may be ordered from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. It contains 29 pages and the price is 75 cents.

Phil Damm Promoted

Philip G. Damm has been appointed chief plant engineer of Merck Sharp & Dohme, Division of Merck & Co., Inc. He will be responsible for maintenance and plant services of both the Philadelphia and West Point, Pa., plants.

He received his B. S. degree in mechanical engineering at Rensselaer Polytechnic Institute in 1946, and worked with Baldwin Locomotive Works and Rheem Manufacturing Company before joining Sharp & Dohme in 1949. He is Regional Vice President of the national organization American Institute of Plant Engineers. He is also President of the Valley Forge Chapter of the American Institute of Plant Engineers.

Safety Manuals

THREE NEW pocket-size safety manuals, dealing with welding, blasting and electricity, have been published by the

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

The wrought iron pipe snow melting system at the basement loading dock of The Electric Auto-Lite Company plant in Bay City, Michigan, has required no maintenance since installation in 1951.

"No maintenance problems"— it's a Wrought Iron Pipe Snow Melting System

For the last seven winters, shipping and receiving at the Bay City, Michigan plant of The Electric Auto-Lite Company has been getting a big assist from a wrought iron pipe snow melting system.

With annual snowfalls averaging 49.1 inches in Bay City the last five years, the snow melting system had to give continuous, trouble-free service. Selection of wrought iron provided this assurance. E. D. Ponder, plant engineer, reports that he has encountered *no* maintenance problems. And, the system has removed more than 4 feet of snow each year since 1951.

Steam from the plant's general steam system—produced by a coal-fired boiler—is piped to the shipping building and passed through an exchanger which heats a solution of water and ethylene glycol. This heated solution is then moved by circulating pump through the winding network of 1½ inch wrought iron pipe, buried in 6 inches of concrete.

A discussion of wrought iron's physical, mechanical and corrosion resistant properties in this service appears in our booklet, *Wrought Iron Pipe for Snow Melting Systems*. This data is yours for the asking. Write for a copy. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

Corrosion costs you more than Wrought Iron

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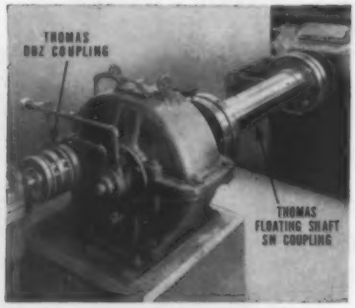

NO LUBRICATION

NO MAINTENANCE

NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

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industrial safety division of the Association of Casualty and Surety Companies, 60 John St., New York 38, N. Y.

Following are the titles and brief descriptions of the three publications:

"Your Guide to Safety in Welding and Cutting Operations." Thirty-two pages of information ranging from such obvious reminders as warnings of the danger of horseplay to tables of specifications for helmets, shields and goggles. Includes sections on: General Safety, Working in Confined Spaces; Ventilation; Fire Prevention; Electric Arc Welding; Spot Welding; and Off-the-Job Safety.

"Your Guide to Safety When Blasting." This 36-page booklet contains numerous illustrations and an excerpt from the American Table of Distances for Storage of Explosives. Includes sections on: Storage; Transportation; Loading Blast Holes; Electric and Non-Electric Priming; Inspection after Blasting; and Misfires.

"Your Guide to Safety from Electrical Hazards." This 18-page booklet points out that: "Every person, whether at home or at work, should know how to protect himself from electrical shock. Includes sections on: General Safety; In Industry; In the Home; and Off-the-Job Safety.

Personnel Changes

James C. Moore has been named an assistant engineer in the plant engineering department at Allis-Chalmers Norwood, Ohio, Works. He is an industrial engineering graduate from the University of California and recently completed Allis-Chalmers training course for graduate engineers.

Ray Reed has been named chief engineer of the railroad division of the Engineering Department at Dana Corporation, Toledo, Ohio. He has been with Dana since 1928, and has held the following positions before his present appointment: assistant master mechanic, assistant chief draftsman and assistant chief mechanical transmission engineer.

How To Dispose of Your Industrial Waste

MANY PLANTS have the problem, because of the location of their facilities, of finding a suitable means of disposing of their industrial waste.

Possibly the answer for your waste problem may be found in the booklet "The Value of Industrial Wastes in the Garden and on the Farm." Information in the booklet is divided into three parts. Part I, tells Why Industrial Wastes Can Be Valuable to the Soil. Part II, tells How to Determine the Value of Waste Products to the Gardener and Farmer. Part III, discusses Merchandising Waste Products for Increased Profit.

This report is based on the results of surveying 100 firms in various industries to investigate the possibilities of using their waste materials as a soil conditioner or fertilizer. In addition, there is a list of fertilizer companies who have expressed an interest in investigating the potential of waste materials.

If you would like a copy of this booklet, address your inquiry to Jeromex Olds, Managing Editor, Organic Gardening and Farming, Emmaus, Pennsylvania.

Chief Plant Engineer Biggs

Charles F. Biggs has been named chief plant engineer for Seiberling Rubber Co., Akron Ohio. He had been special production coordinator in the company's production division before receiving his new appointment.

Since he joined the company in 1946, he has worked on mat mold design, in engineering and quality control, as plant manager at the plastics division in Newcomerstown, Ohio, and as foreman in all departments in the tire building division.

Plant Maintenance Conference

IN 1958, the Plant Maintenance and Engineering Show and Conference will return to Chicago. Dates of the conference will be January 27, 28 and 29. The show will run through January 30.

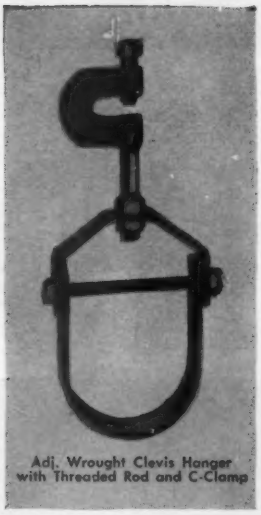
One of the new aspects of both the show and the conference will be the presentation of methods and equipment to eliminate pollution of air and water, both within and outside the plant.

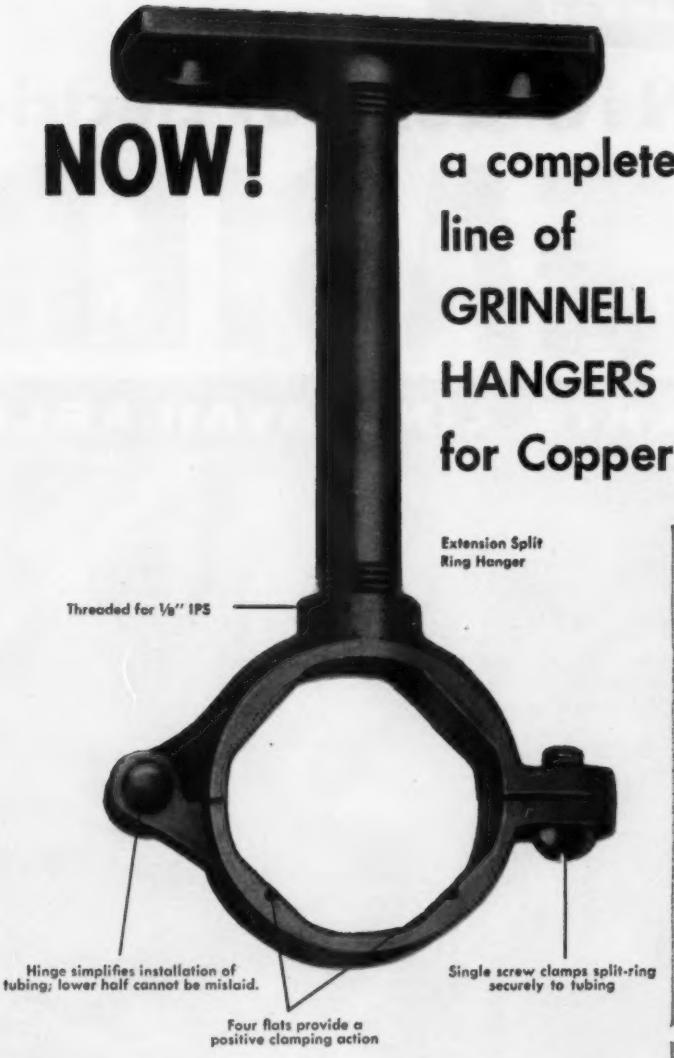
Here is a brief rundown of some of the subjects to be presented at the conference:

Use of Welding in Maintenance; How to Save on Electric Power Bills; Upkeep of Electric Motors; The Broad Responsibilities of Plant Engineering; Keeping an Automation Plant Running; and the Fundamentals of Maintenance Cost Control.

Advance registration cards and hotel information may be obtained by writing to Clapp and Poliak, Inc., 341 Madison Avenue, New York 17, N. Y.

NOW! a complete line of GRINNELL HANGERS for Copper Tubing


Adj. Wrought Clevis Hanger with Threaded Rod and C-Clamp


Extension Split Ring Hanger
Threaded for ⅛" IPS
Hinge simplifies installation of tubing; lower half cannot be mislaid.
Four flats provide a positive clamping action
Single screw clamps split-ring securely to tubing

Adj. Wrought Ring Hanger

Split-Ring with Socket and Coach Screw

Adj. Wrought Band Hanger

Grinnell now offers, in one *complete* line, every standard type of hanger and support for copper tubing. All are heavily copper plated for long, rugged wear. All are accurately sized to fit standard copper tubing, and designed to give a neater installation wherever copper tubing is used.

For dependability, speed, and convenience . . . let Grinnell's coast-to-coast network of warehouses and jobbers serve you as a one-stop source for all your copper tubing hanger requirements. Grinnell-trained personnel are ready to work with you "on-the-job", anywhere, to help solve any problem connected with hangers and supports for copper tubing.

Whether it be for copper tubing or standard pipe, specify Grinnell hangers. No other company makes as complete a line; provides as thorough a distribution service; or can cooperate as fully on *all* your piping assignments.

Write for your copy of the COPPER TUBING HANGER Catalog. Grinnell Company, Inc., 222 West Exchange St., Providence, Rhode Island.

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NOW EASIER

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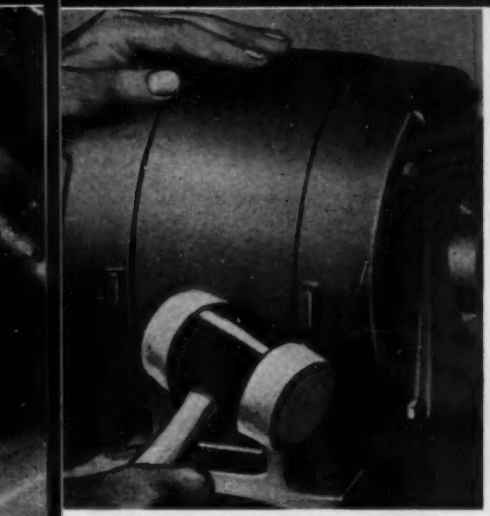
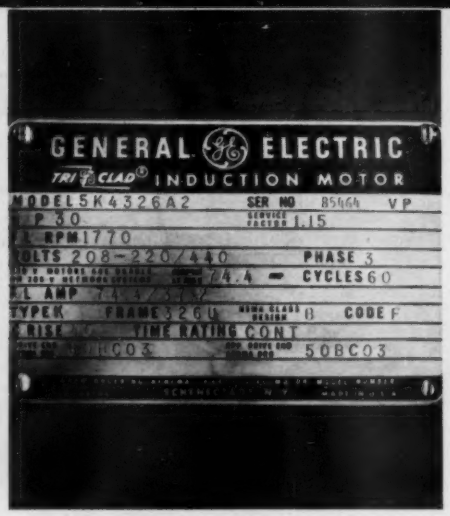
THROUGH 125-HORSEPOWER



FAST END-SHIELD REMOVAL is possible because of Tri-Clad '55' motor's rugged knock-off lugs. Remove four bolts, tap on knock-off lugs and end-shield is off to permit easy repositioning or quick motor inspection.



EASIER TO MAINTAIN, Tri-Clad '55' motors utilize a stainless-steel, non-corrosive nameplate to give complete rating information including AFMBA bearing numbers. Separate steel plate gives connection diagrams.

EASIER TO INSTALL, Tri-Clad '55' motors use Perma-numbered leads to simplify wiring, speed motor hook-up. Numbers are stamped on terminals and printed on every half-inch of Geoprene® leads.

immediate shipment . . . all ratings

The need for faster production schedules and reduced production costs has made motor maintenance of prime concern to motor users. Modern motors must be easy to inspect and maintain without loss of production time due to routine maintenance.

TO MEET THIS NEED, G-E Tri-Clad '55' motors feature an oversize grease reservoir which contains enough grease for normal 5-year operation. Yet, new grease can be added while the motor is running. Other easy maintenance features are described above.

EASE OF MAINTENANCE, however, is not the whole Tri-Clad '55' motor story. Experienced G-E motor engineers have used revolutionary materials and the most modern production and testing facilities to provide a motor that is not only easier to maintain, but also more reliable and easier to install.

Formerly available only to 30-hp, these proven Tri-Clad '55' motors are now available for immediate shipment—usually from nearby warehouse stocks—up through 125-hp.

FOR FULL INFORMATION on the complete Tri-Clad '55' motor line contact your nearest G-E Apparatus Sales Office or Distributor.

Section A891-7
GENERAL ELECTRIC COMPANY
Schenectady 5, New York

Please send me the following publications:

☐ **FREE BULLETIN (GEA-6602) describes advanced features of new Tri-Clad '55' motors through 125-hp.**

☐ **FREE SLIDE RULE (GEN-148) to determine weight and space-saving benefits of new Tri-Clad '55' motors.**

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GENERAL ELECTRIC

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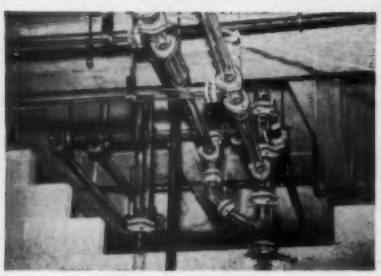
It's hammer strong: You can actually hammer nails through a block of wood with PYREX Drainlines. A new heat-strengthening process gives additional strength at the joints where it is needed most.



It's easy to install: Any plumber can install this drainline. One contractor proved he could make connections with PYREX Drainlines 16 times faster than bell and spigot connections on metal drainline. All fittings are standard.

It's easy to clean: Even the stickiest chemicals find it hard to cling to PYREX brand chemical glass. Should they stick, a simple acid or steam flushing removes them quickly.

Now...PYREX® Drainlines for corrosive wastes

Give you corrosion resistance, easy maintenance, and strength

Now you can convey corrosive wastes from plant laboratories and processes quickly and safely in pipe that takes a minimum of maintenance.

Corrosion Resistant

PYREX Pipe Drainlines are resistant to more chemicals than any other piping material; in fact, only hydrofluoric acid and hot alkalies above pH 12 corrode them.

Little Maintenance Required

First, you won't have leakage caused by corrosion; so there's no curative maintenance called for.

Second, preventative maintenance is just as simple, since even the stickiest materials find it difficult to cling to the smooth surface of PYREX Pipe. This smoothness of surface makes cleaning easy, too.

And, unless it is enclosed in some manner, you get the unique bonus of transparency. You can see the condition of the entire drainline at all times. Should something block the line, you can locate it exactly, remove for cleaning only the section that's blocked.

Competitive Cost

Usually you'll find PYREX Drainlines cost you no more than conventional lines. Frequently they cost less.

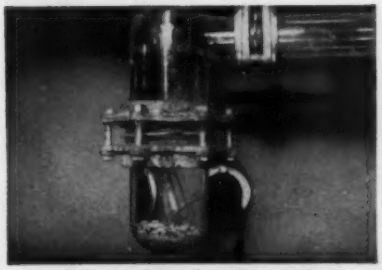
The pipe is competitively priced. You can often specify one diameter smaller than with other materials because there is hardly any scale build-up with PYREX Drainlines. And you don't need clean-out plugs.

Real savings begin as soon as you install PYREX Drainlines. The pipe is lighter, easier to handle, requires only half the supports used with most conventional metal drainlines.

Because it's available in long pieces, it requires fewer connections, often only half as many. Just two small wrenches are all it takes to make a joint; no hot lead needed, no tricky expansion joints.

All Standard Sizes and Fittings

Whether you're planning a new installation or replacing a faulty one, you'll find a PYREX Drainline in the size you want. Available in diameters from 1″ to 6″. You can get all standard sink traps, cup sinks, tees, elbows, crosses, etc. made with the same glass.



You can see through it: You can always inspect a PYREX Drainline and its contents visually. It's not likely to happen, but should something clog the line, you can find its location quickly and exactly.

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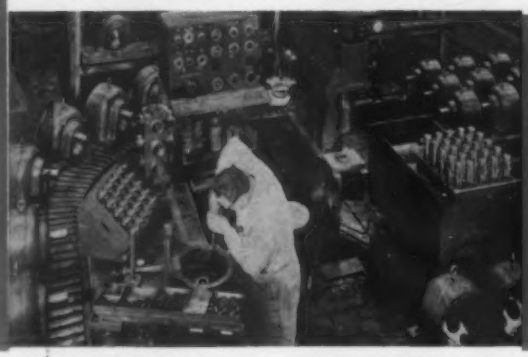
Quick delivery from stock... LINK-BELT enclosed drives offer exact, efficient answers to any combination of service factors—ratio, speed, hp, load

COMPACT, CAST IRON, CORROSION-RESISTANT HOUSINGS prevent oil leakage . . . provide great rigidity . . . maintain permanent alignment of all parts. In addition, Motogear, Gearmotor and In-Line helical gear drive housings provide for the latest NEMA motor sizes.

CHANCES are that every production operation in your plant requires its own combination of drive characteristics. And Link-Belt's complete line of speed reducers gives you the right answer to every need every time . . . plus convenient, one-source supply. Each drive is designed in response to a basic industrial requirement . . . with types



CAREFUL ASSEMBLY OF PRECISION PARTS assures proper fit, long life. Here operator assembles gear and bearings on shaft. Sturdy bearings protect against shock and overloads. Hardened gears produced on modern hobbers are shaved, assuring efficient power transmission.

MODERN PRODUCTION-LINE FACILITIES assure the economies of mass production plus abundant supply. From initial manufacturing stages through final inspection, facilities and techniques—including this spray painting operation—are among the most modern in industry.

in speed reducers?

for specific variations in service conditions.

Link-Belt also makes industry's most extensive line of related power transmission products, and can supply complete, job-mated, pre-engineered drive combinations. The next time you need a drive, see your Link-Belt district office or authorized stock-carrying distributor. Ask for literature.

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THE SYMBOL OF QUALITY — LINK-BELT

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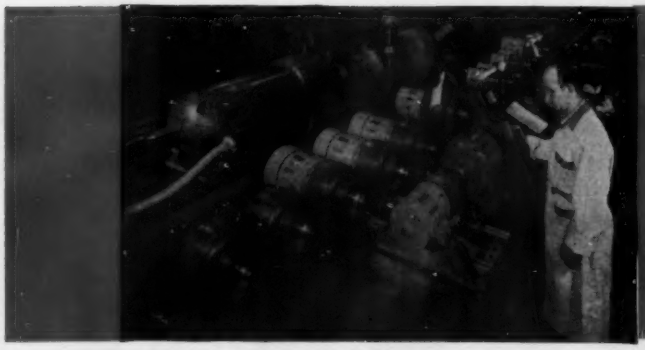
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,579



LOAD TESTING with the latest in instrumentation is one of many Link-Belt quality controls. Such thorough tests are your assurance that the drive you buy is leak-proof...all parts are properly aligned...unit is effectively sealed for long, trouble-free performance.

SOUND TESTING with sensitive sound-level meters provides additional proof that drives are in perfect working order. Extreme quietness of Link-Belt enclosed drives is the result of perfect mating of gears and sound-dampening property of cast iron housings.

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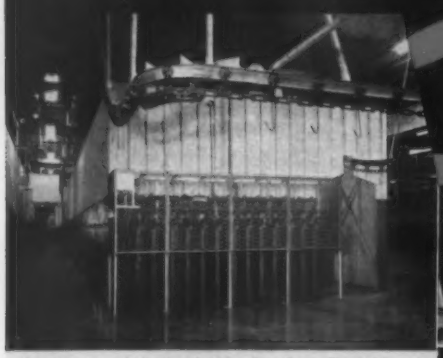


Exterior view of Ventilated Active Drip Zone. Clean, Filtered Air is Supplied to this enclosure. Fume-laden air is exhausted.

View showing glass in one side of Inactive Drip Zone where parts may be seen prior to entering Baking Oven.

View of Mahon Flow-Coating Equipment at Chrysler Corporation of Canada, Limited. This is part of a Complete Mahon Finishing System for Coating Black Enamel Parts.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

View of Mahon 450° Enamel Baking Oven. Oven is built against ceiling trusses to provide parts storage space below.

Another view of the Enamel Baking Oven. Finish is baked for 20 minutes at 450° in this 80 Ft. x 24 Ft. Mahon Oven.

Black Enamel Parts at CHRYSLER CORPORATION of CANADA, LIMITED, are FLOW-COATED in MAHON FINISHING SYSTEM!

In addition to the body finishing system at the Windsor plant of Chrysler Corporation of Canada, Limited, Mahon also installed a complete finishing system for black enamel parts. This is a Flow-Coating System which includes a Mahon Flow-Coating Machine, a Ventilated Active Drip Zone, a Ventilated Inactive Drip Zone, and a 450° Finish Baking Oven with storage space below. Two Enamel Mixing Tanks and a Solvent Tank are provided outside the enclosure. The recirculating unit is equipped to automatically maintain the enamel at a specific temperature in the Flow-Coating Chamber. This is a typical Mahon Flow-Coating System, complete in every detail —automatic from start to stop. If you have a finishing problem, or are contemplating new finishing equipment, you will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified to do the all-important planning and engineering of equipment—which is the key to fine finishes at minimum cost. Whether your job is to be Flow-Coated, Dip-Coated, or Spray Painted either Manually or by Electrostatic Process, you will find that Mahon equipment will serve you better, because it is engineered better and built better for more economical operation over a longer period of time. Mahon will do a complete job for you on one contract—undivided responsibility for the entire system insures proper coordination and safeguards you against complications which can upset your production schedules. See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-657.

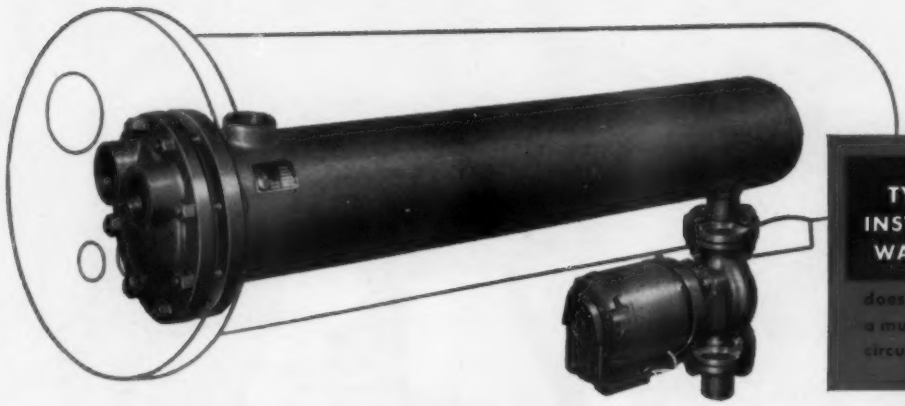
THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 509 on Reply Card



TYPE "WU" INSTANTANEOUS WATER HEATER

does the same job as a much larger gravity circulated heater

PRODUCES *MORE HOT WATER*...SAVES SPACE...SAVES MONEY

Pumped boiler water circulation steps-up capacity...permits close temperature control

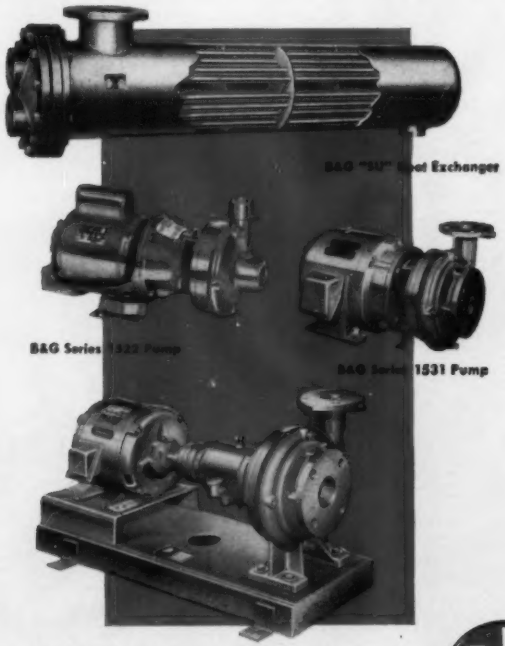
This B&G Heat Exchanger offers three important advantages—

1. More hot water from a smaller unit. The "WU" comes equipped with a B&G Booster Pump which pumps boiler water through the baffled shell, greatly increasing the capacity of the heater. Large volumes of hot water are produced by amazingly small units.

2. Controls water temperature. The Booster is controlled to start whenever water temperature goes below the desired degree. Boiler water is pumped through the shell of the "WU" until service water is again at the correct temperature.

3. Cuts installing cost. Because of pumped circulation, the smaller piping and fittings required materially reduce cost...cutting and threading can be done on the job. No storage tank needed.

"WU" Heat Exchangers can be installed on hot water boilers or below the water line of steam boilers.



B&G Series 1510 Type B Pump

FAST DELIVERY

ON PUMPS AND HEAT EXCHANGERS FROM FACTORY STOCK ON HAND*

A comprehensive stock of most commonly used sizes of heat exchangers and pumps is maintained at the factory —ready for immediate delivery. Your local distributor or B&G Representative will be glad to assist in selecting the proper unit for your needs. Or, write, phone or wire the Bell & Gossett factory at Morton Grove, Illinois.

B&G Heat Exchangers are products of over a quarter century's experience in heat exchange design...manufactured under constant supervision to ASME Code. B&G stock Centrifugal Pumps are distinguished by vertical split-case design...bronze-fitted construction...non-overloading motors and leak-proof "Remite" mechanical seals. They can be serviced without disconnecting pipe lines or motor leads.

Send for catalogs of B&G Heat Exchangers and Centrifugal Pumps.

*Do you receive our Monthly Availability Report on B&G Heat Exchangers? If not, send your name.

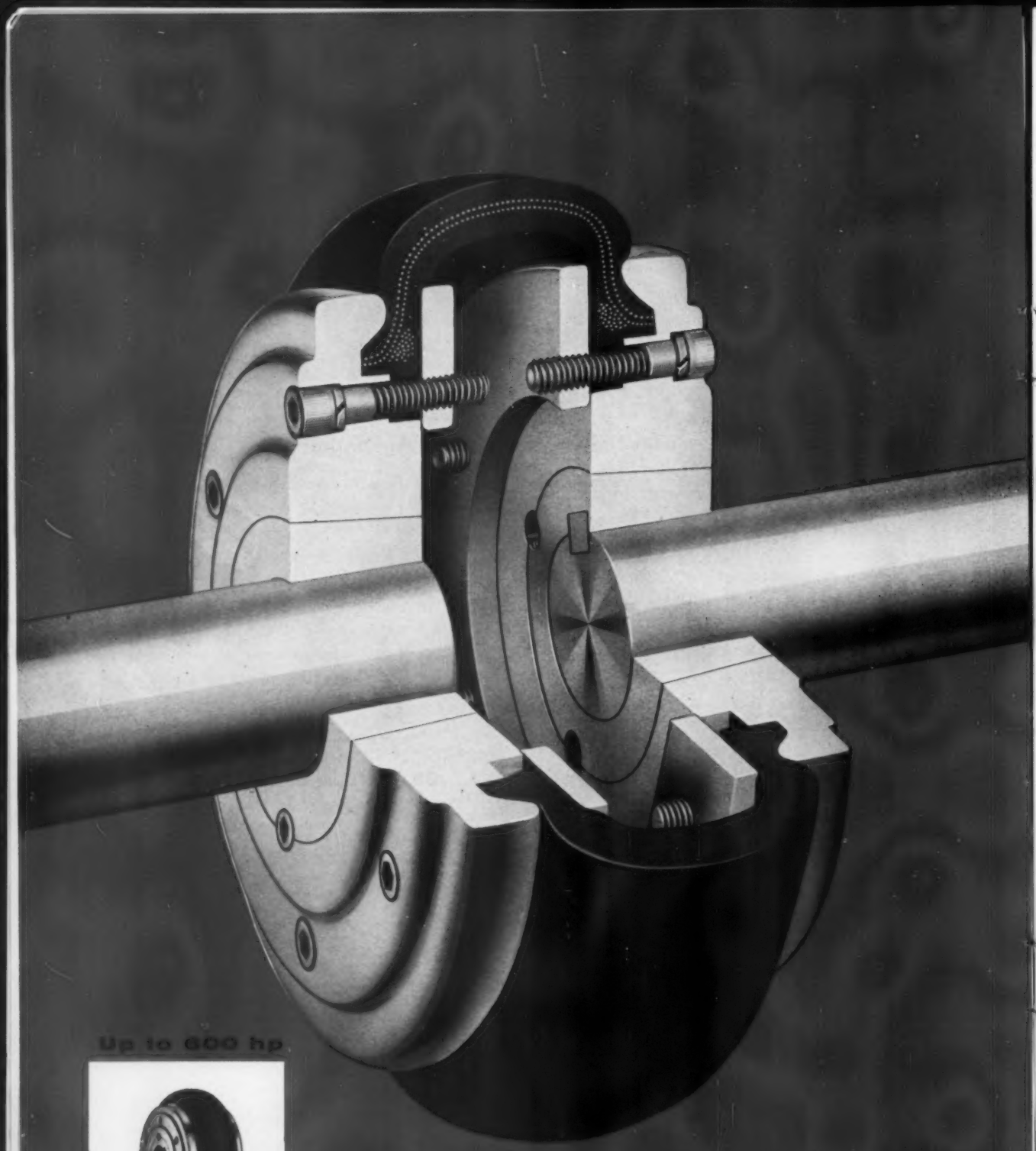
BELL & GOSSETT

COMPANY

Dept. EZ-53, Morton Grove, Illinois

Canadian Licensee: A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

For more facts circle 510 on Reply Card



Up to 600 hp

NOW! THE COUPLING WITH THE 4-WAY FLEX!

Para·flex

FLEXIBLE CUSHION COUPLING

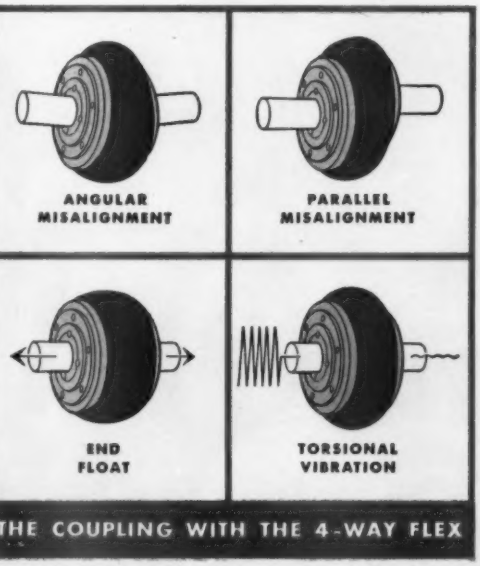
THE NEW IDEA IN FLEXIBLE COUPLINGS... WITH A FLEXING BODY THAT AUTOMATICALLY COMPENSATES FOR ALL COMBINATIONS OF MISALIGNMENT AND END FLOAT... AND CUSHIONS SHOCK LOADS!

THIS Coupling "swallows up" misalignment! Its ability to handle multiple displacement is exceeded only in a universal joint. It outperforms the most complex coupling mechanisms—yet it operates with the simplicity—*and the dependability*—of a modern tire!

The technological advances that contribute to the miracle of today's truck tires, which are engineered to carry tremendous loads at high speeds and stand terrific shock, have made this new type of coupling possible.

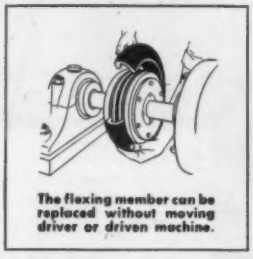
The heart of Para-flex is a tire with synthetic tension members bonded together in rubber. It is pliant. It "fits itself" to changing shaft conditions—angular, parallel, end-float, *or any combination of all three!* Depending upon the size of coupling and duration of shaft misplacement, it handles angular misalignment up to 4°, parallel up to ⅛" and end-float up to 3/16".

It cushions the stresses of shock loads to a remarkable degree. And it tends to absorb torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.



There is no metal-to-metal contact between shafts. They are insulated. No lubrication is required.

Para-flex takes a minimum of space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding parts. And since the flexible member is molded with a transverse split, it can be replaced *without moving either the driver or driven machine!*


The flexing member can be replaced without moving driver or driven machine.

Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 600 hp at 900 rpm. Call your distributor for early delivery to *make your own test.* You'll witness something revolutionary!

DODGE MANUFACTURING CORPORATION, 2700 Union Street, Mishawaka, Indiana

DODGE

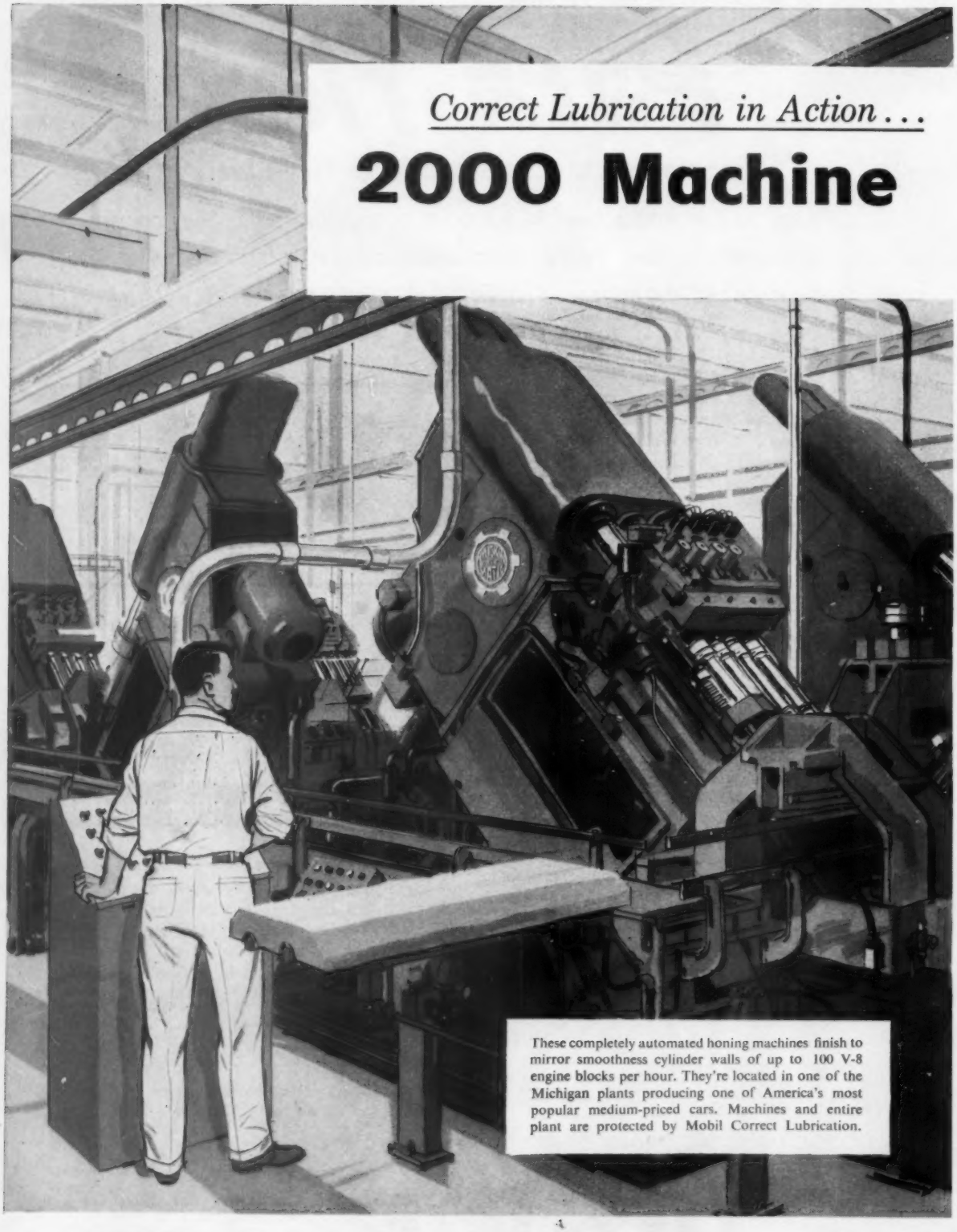
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new methods. Look for his name under "Power Transmission Machinery" in the yellow pages of your classified telephone directory—or write us.

For more facts circle 511 on Reply Card

Correct Lubrication in Action . . .

2000 Machine



These completely automated honing machines finish to mirror smoothness cylinder walls of up to 100 V-8 engine blocks per hour. They're located in one of the Michigan plants producing one of America's most popular medium-priced cars. Machines and entire plant are protected by Mobil Correct Lubrication.

Mobil **SOCONY MOBIL**

Leader in Lubrication for over 91 years

in the **Automotive Industry**

Production Hours Saved

6000 REPAIR MAN-HOURS ELIMINATED!

Two of many cost-cutting benefits achieved by this leading automobile company with the help of Socony Mobil

The machines used to produce this automobile company's V-8 engines are so complex and closely interlocked that the failure of one small part may result in the shutdown of an entire production line.

That's why company management recommended the adoption of a planned lubrication program . . . decided on the depth of service offered by Socony Mobil Correct Lubrication. Under this comprehensive program, plant personnel and Mobil engineers coordinated their efforts so effectively that the size and number of maintenance savings have significantly added to company profits.

To cite one example—After surveying 650 hydraulically operated machines in this company's axle and motor plants, Mobil engineers noted use of 8 different hydraulic oils. Their varying performance caused excessive downtime, constant repairs, short oil batch life. Minor machine modifications suggested by Mobil engineers permitted use of a *single* wide-range high quality Mobil hydraulic oil. In just two years, this change made available 2000 additional production hours . . . eliminated 6000 repair man-hours . . . saved 10000 gallons of oil.

* * *

Here's another example of Correct Lubrication in action...proof that it can pay to rely on Socony Mobil.

More Savings—made with the help of Socony Mobil Correct Lubrication

This chart gives some idea of the extent and size of savings achieved through the knowledge, service, facilities and quality products available through Mobil Correct Lubrication.

	Machine Production Hours Saved	Machine Repair Man-Hours Saved	Repair Parts Saving	Savings Period
Hydraulic Systems	2000	6000	Not Recorded	1953-55
Trio Nut Runners	138	276	$1610.	1952-55
Air Wrenches (Motor Assembly)	Not Recorded	188	Not Recorded	1952-55
Bullard Chucks	82	328	Not Recorded	1952-55
Landis Wheel Dresser Bearings	Not Recorded	Not Recorded	87½%	1952-55
Keller Air Hoist	Not Recorded	276	$8970.	1952-55
Ex-Cell-O Cylinder Boring Machines	100	800	$8750.	1952-55

Correct Lubrication

A proved program to reduce equipment maintenance costs

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

For more facts circle 512 on Reply Card

In Iron Body Wedge Gate Valves,
Outside Screw and Yoke Design,

Walworth offers you these 8 outstanding advantages!

STRONGER CONNECTIONS. T-head disc-to-stem connection on OS&Y types permits wedge to properly seat itself.

TIGHTER SEAL. Solid web type disc on OS&Y valves provides tight closure, greater strength and longer service.

REDUCED TURBULENCE. Fluid action is minimized due to this straight-flow port design.

FEWER OBSTRUCTIONS. Seat rings of bottom-seated types are screwed into body to prevent gum and grit accumulations.

*WALWORTH is a registered trademark of WALWORTH COMPANY

Walworth Subsidiaries: ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO.

SURE-GRIP HANDWHEEL. Fluted design assures a sure grip, even with greasy gloves.

HIGH CORROSION RESISTANCE. Brass liner protects glands from deterioration and scoring.

EASIER REPACKING. Hinged gland eye-bolts on OS&Y valves permit fast maintenance under full pressure.

LESS DAMAGE. Bronze back-seat bushing in bonnet of OS&Y valves prevents scoring, guides stem accurately.

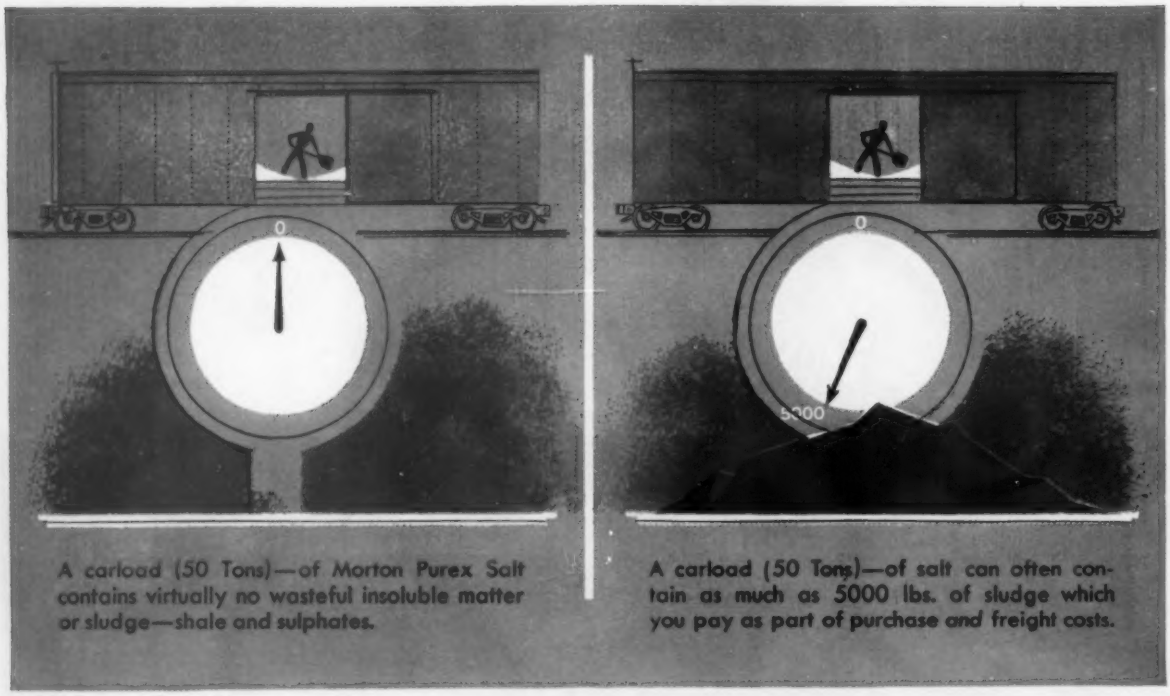
Walworth Iron Body Gate Valves are available with screwed or flanged ends, in sizes and types for every purpose.
For full information see your Walworth Distributor or write:
Walworth Company, 60 East 42nd Street, New York 17, N. Y.

WALWORTH*

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

M & H VALVE & FITTINGS CO. • SOUTHWEST FABRICATING AND WELDING CO., INC. • WALWORTH COMPANY OF CANADA, LTD.

For more facts circle 513 on Reply Card

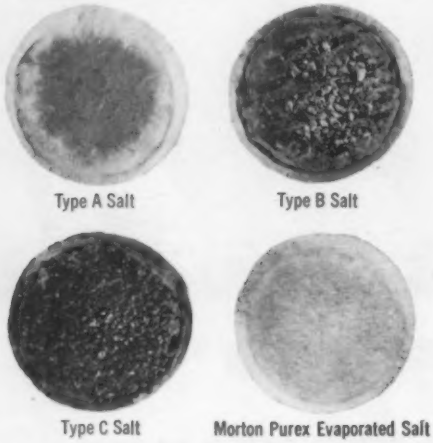


A carload (50 Tons)—of Morton Purex Salt contains virtually no wasteful insoluble matter or sludge—shale and sulphates.

A carload (50 Tons)—of salt can often contain as much as 5000 lbs. of sludge which you pay as part of purchase and freight costs.

Stop paying for wasteful sludge —switch to Purex Salt

These filter pads (approximately 1/5 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various kinds of salt.



Type A Salt | Type B Salt

Type C Salt | Morton Purex Evaporated Salt

Tests for insolubles taken from random samples show you that Morton Purex is the only one that contains no wasteful sludge or insolubles.

For more information about Morton Purex Salt, and for free, expert help on any water-softening problem, write:

When you buy Morton Purex Salt, you get high purity evaporated salt that is made in a controlled-particle size to prevent packing and channeling. With Purex, none of your purchase price or freight bill goes toward paying for useless, troublesome insoluble matter.

With Morton Purex, no time or labor is wasted in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex will leave no accumulation of material in either brine or water softener tanks. It can be used in wet-storage systems, and in the Morton Model-E Brinemaker.

MORTON SALT COMPANY

INDUSTRIAL DIVISION

Dept. PE-10, 120 So. LaSalle Street, Chicago 3, Illinois

BULLETINS Just released and of immediate plant interest

MATERIALS HANDLING

101 Cranes, Monorail Systems—This 8-pp catalog describes cranes and monorail systems manufactured by the company. Contains complete specifications and information on capacities, dimensions and other details. Spanmaster Crane Div., Jervis B. Webb Co.

102 Material Lifting Equipment — This series of six bulletins features hydraulically-powered material lifting equipment. Catalog 157, 8-pp, describes Vari-Ramps, a loading dock ramp which enables factory trucks to drive onto truck beds. Bulletin 213-M lists Vari-Ramp benefits and cost-saving features. Catalog 257, 8-pp, contains description, dimension drawings, and operating instructions for platform lifts, loading docks, and feed tables. Bulletin 215-M lists features and includes specifications. Bulletin 357, 8-pp, offers dimension drawings, operating instructions for factory truck maintenance lifts. Bulletin 214-M lists specifications. Bulletin 216-M 6-pp, summarizes line. Joyce-Cridland Co.

103 Materials Handling System—Catalog 89, 10-pp, describes the versatile Work-O-Matic. described as a material handling system offering advantages in storage, moving and handling of parts and materials in process. Includes photos of this positioning stand and multi-duty box combination in use, and gives detailed information on range of standard units, capacities and dimensions of stands, boxes and trays. The Union Metal Mfg. Co.

104 Industrial Trucks — The right truck and attachment for practically every mechanical handling application is covered in 12-pp Form 1491. Working specifications given include load capacity, engine horsepower, stacking aisle and turning radius, tire size, grade climbing ability, lifting and travel speed, truck weight and optional equipment. Hyster Co.

105 Bulk Materials Handling—Catalog 6 is a 20-pp photographically-illustrated booklet on a system of bulk materials handling. Describes system in detail, explaining automatic filling and discharging stations; describing inter and intra plant applications of aluminum tote bins and tote tilts; and giving construction specifications. Typical installations are illustrated. Tote System, Inc.

106 Automatic Bulk Handling—Bulletin 530, 32-pp, on Airstream conveyors, presents information showing how pneumatic conveying has solved many bulk handling problems. System diagrams of typical installations point out applications and flexibility of conveyors. Over 70 illustrations show how air transports granular or powdered bulk material. Dracco Corp.

107 Pneumatic Conveying Systems—Bulletin 143-B describes stationary and portable pneumatic conveying systems. Conveying under both pressure and vacuum is covered and several typical applications are illustrated. Specific information is provided on size of unit, rate of conveying, type and weight of material. The Spencer Turbine Co.

108 Wire Rope Manual—"Inspection of Wire Rope," "Methods of Lubricating Wire Rope", 'Use and Abuse of Wire Rope," and "Sheave Maintenance" are a few of many subjects covered in this 188-pp Wire Rope Manual, Catalog G-16. In addition, there are sections devoted to strengths and weights of wire rope, cable assemblies, and rated capacity of slings. A complete reference guide on care and use of wire rope and slings, Manual is in handbook size and tab indexed. Available to qualified plant engineers, please state your job title when requesting this. Macwhyte Co.

MAINTENANCE

109 Cleaning, Maintenance — "How to use measured work techniques to reduce cleaning and maintenance costs" is the subject of this 28-pp illustrated booklet. Explains how to determine cleaning costs, establish job time requirements, and conduct time study. Also covers importance of determining proper work loads; how to establish quality and frequency standards; how to simplify future maintenance problems when planning new construction; and how to select equipment. Advance Floor Machine Co.

110 Vacuum Units — This bulletin describes heavy-duty, portable vacuum units designed for a variety of plant housekeeping jobs. Application in removing litter, conveying or reclaiming materials, and collecting hazardous matter, are also detailed. Invincible Vacuum Cleaner Mfg. Co.

CONSTRUCTION

111 Architectural Products — This 24-pp bulletin contains complete technical information relative to company's line of joists, studs, channels, ribbed decking and metal curtain walls. It is copiously illustrated and contains several pages of loading tables. Installation and other details are illustrated. Stran-Steel Corp.

112 Construction Data—This 108-pp handbook contains over 30 construction tables, guides and time saving charts to help solve problems in building maintenance, construction and engineering. Three separate indices permit quick, easy reference to over 95 specialty products manufactured by the company. With each product description is a brief outline of recommended uses, methods of application, covering capacity, colors, packaging and shipping data. A. C. Horn Co., Inc., Sun Chemical Corp.

113 Fir Plywood — This 34-pp construction guide contains full-page structural drawings providing basic information on types, grades, and applications of fir plywood. Booklet covers information on floor construction, single and double wall construction, and roof construction. It is designed for maximum simplicity of use and quick reference, bound in notebook form. Douglas Fir Plywood Association.

114 Floor Gratings—Advantages and characteristics of three types of grating construction are detailed in this 16-pp catalog. Various types of gratings are illustrated and described, and safe load tables are included. Steel safety steps, aluminum floor gratings, steel floor armor, steel roadway grating, and sidewalk slabs are also covered. Borden Metal Products Co.

FANS, BLOWERS

115 Heavy-Duty Fans — Bulletin MD-102, 24-pp, explains construction, operations, and specifications of a line of fans for heavy industrial and commercial installations. Describes in word and picture detail, the specific applications of this line of aerodynamically designed packaged direct drive units and V-belt fans. Features performance data, as well as dimensions, practical applications. Chicago Blower Corp.

116 PVC Blowers and Fans—Advantages of un-plasticized rigid polyvinyl chloride blowers and fans for exhausting corrosive air, fumes and gases are detailed in this illustrated bulletin. Physical properties of polyvinyl chloride are tabulated. An insert sheet describes other PVC products. Industrial Plastic Fabricators Inc.

SPACE, PROCESS HEATING

118 Unit Heaters — Catalog B-1523, 26-pp, describes features and advantages of company's unit heaters for commercial and industrial applications. Details of construction are illustrated and described, and typical specifications, application data, selection tables, outline dimensions and maintenance instructions given. Piping diagrams included. Westinghouse Electric Corp.

Reader Service Cards for ordering bulletins are on pages 275-276. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

119 Overhead Heating Units—Bulletin P 1-57, 16-pp, contains photographic reproductions of overhead gas-fired heaters, as installed in a variety of commercial and industrial plants. How this type of heating was used to solve specific heating problems is detailed. Prat-Daniel Corp.

120 Storage Tank Heaters — Supplement 202A, 8-pp, contains hook-ups of electric heaters and contains heat-requirement nomographs for storage tanks handling viscous fluids. Fluids covered include fuel oil, asphalt, road oils, molasses, tallow, animal fats, sodium and sulphur. Hook-up schematics and installation photos show how

BULLETINS

(Begins on page 21)

electric heaters can be installed in storage tanks of different sizes, types and services. Hynes Electric Heating Div., Turbine Equipment Co.

VALVES, PIPING, FITTINGS

122 Regulating Valves—Catalog 307, 6-pp, describes company's Series 30 control valves, designed for control of all types of fluids. Balanced, tight-closing, single-seated features are fully detailed and flow characteristics are charted. A table of dimensions and weights, and sizing data are included. Schade Valve Mfg. Co.

123 On Lubricated Plug Valves — This 12-pp illustrated manual covers function of lubricants in lubricated plug valves and the essential properties of an effective lubricant. Detailed information on how to select the right lubricant and how to apply it is presented in text and pictures. Charts list flow materials which plug valves servvice, recommended lubricant number, service range. Walworth Co.

124 Compressed Air Valve — This 6-pp bulletin describes features and advantages of company's safety valve for compressed air, designed to safeguard against unnecessary accidents. Installation instructions and design data included. Sands Safety Valve Co.

125 Bronze and Iron Valves—Profusely illustrated, 136-pp Catalog 57 includes such recent additions to company's line as renewable seat ring bronze gate valves, composition disc bronze swing check valves and solder end globe valves with drain. An important modification of the 125-lb iron body gate valves—through-port design to reduce turbulence and pressure drop in flow through valves—is illustrated. Technical data for the initial design of piping layouts are included, as well as a table of equivalent resistance of valves, fittings, and bands, and charts for the rational solution of pressure drop. This book is available to qualified plant engineers, please state your job title when requesting it. The Fairbanks Co.

126 Liquid Strainer — Self-cleaning liquid strainers designed for the straining of fluids without interrupting the flow for cleaning the screen are described in Bulletin W-6SC. Dimensions are tabulated and diagrams of manual operation and motor driven units shown, with listing of parts. Golden-Anderson Valve Specialty Co.

On pages 275-276 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

127 Aluminum Jacketing — Bulletin 530a features company's line of aluminum weather-proof jacketing for insulated lines, towers, vessels and tanks. Application procedures are pictured and suggested specifications are offered. Childers Mfg. Co.

PUMPS, COMPRESSORS

128 General Service Pumps—Catalog D-100 describes four types of general service pumps, designed for hot and cold water and brine circulation, air conditioning systems, sprinkler systems, boiler feeding, pressure boosting and washing machinery. Cutaway drawings, performance data, specifications given. C. H. Wheeler Mfg. Co.

129 Vertical Non-Clog Pumps — Catalog F-100 describes advantages of company's vertical non-clog pumps, designed for sewage disposal, underpass service and drainage, and for many applications in reduction plants and paper mills. Three different dry pit installations are shown, and a cutaway drawing illustrating mechanical features included. C. H. Wheeler Mfg. Co.

130 Exhausters, Compressors — Eight-pp Bulletin 4E describes company's exhausters—air and gas pumps which operate on the jet principle, at moderately high vacuum, using live steam or air as motive force. Includes application, construction, and operation information on the various types and sizes for use in chemical service. Capacity curves, capacity ratios, and steam and air consumption tables provided. Schuette and Koerting Co.

INSTRUMENTS, CONTROLS

131 Meters, Controls — Instruments introduced within last year are included in the 8-pp 1957 edition of this company's Bulletin G15-1. Applications, ranges and detailed literature references are given for transmitting, recording, indicating and controlling instruments. Bailey Meter Co.

132 Economy of Metering—Bulletin N1-57 contains 12-pp of cost-saving metering information, including a number of case histories. Also described are various meters and registers, maintenance rules, installation suggestions, and results of surveys in food and chemical processing industries which tell how these industries gain cost savings, control, inventory costs, and improve quality control with industrial liquid meters. Neptune Meter Co.

133 Contact Meter-Relays — Details on automatic control with contact meter-relays are featured in 40-pp Catalog 4D. In addition to an illustrated description of construction and operation, it includes a detailed section on circuitry and price and specification information on various relays. Catalog is profusely illustrated with photos and diagrams, and contains actual size dial areas and typical scale arcs. Assembly Products, Inc.

134 Meter and Control—Publication 54-766, 8-pp, describes the Veriflow, which meters, indicates and totalizes liquids, such as water, molasses, sulphuric acid, etc., using the positive displacement principle, and the Veritrol, which controls material being metered. Principle, construction, operation and features of both meter and controller are explained. The Hays Corp.

135 Time Meters — Bulletin GEA-6710 describes advantages and typical applications of company's electric time meters, featuring an extra digit for wider range of measurement. Price information and dimensional diagrams are included. General Electric Co.

136 Pneumatic Drive Units—Bulletin 1033 describes pneumatic power drive units for remote operation and positioning of valves, dampers, louvers, rheostats, vanes and variable-speed drives. Explains principle of operation, and gives mechanical specifications, table of sizes, torque ratings and weights, and torque output curves. Copes-Vulcan Div., Blaw-Knox Co.

137 Weighing Bulk Material — Twenty-pp Bulletin 12, on measurement and control of bulk weighing, is a comprehensive coverage of instrumentized weighing. Compares batch-in, batch-out and continuous weighing processes, explains how an automatic system can be assembled by building-block techniques using unitized weighing components. Both pneumatic and electrical weight transmitters are discussed. Weighing and Control Components, Inc.

138 The Systems Concept—The first of a series of ten contemplated educational booklets on "Systems Engineering Applied to Combustion Control," this 16-pp booklet introduces the system's concept which produces automation-in-combustion. Need for specific instruments for efficiency and safety, and their correct integration into the system is discussed. Reasons for and fundamentals of draft control, requirements and mechanics of draft control are treated, and interlocked controls and safety devices are explained. Cleveland Fuel Equipment Co.

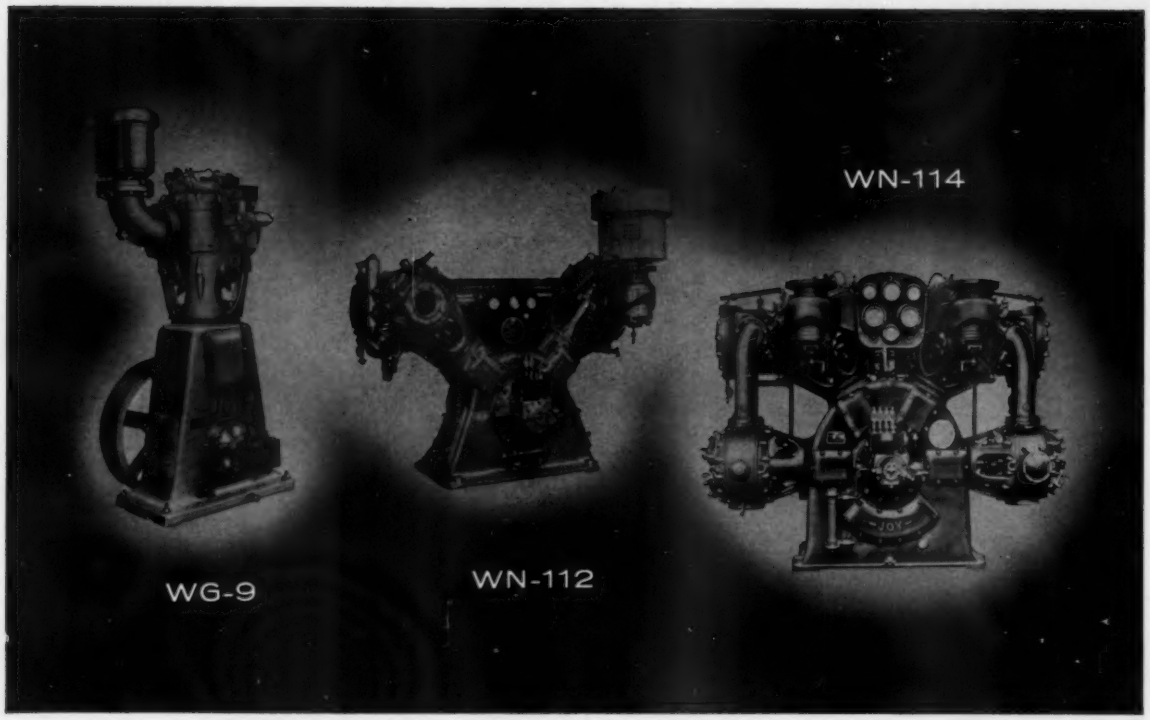
139 Mechanical Btu Meter—Bulletin 1000 describes a completely mechanical instrument that measures heat in thermal units and liquid-flow in gallons with high precision. Construction and operation are fully described, and selection data is included. Air Conditioning Equipment Corp.

DUST CONTROL

141 For Wet Type Collectors — Hard deposits, congestion and corrosion greatly decrease the efficiency of wet-type dust collectors and necessitate frequent clean-outs. Bulletin WDC shows how proper water treatment will reduce these faults and promote peak efficiency. The North American Mogul Products Co.

142 Air Distributing Units — Electronic air cleaner sections for company's air distributing units are described in this illustrated bulletin. Three dimensional view of component parts folds out to reveal fan section, cooling section, heating coil and precipitron, along with descriptive details on each. Westinghouse Electric Corp.

(More Bulletins on page 277)



NEED TO *Expand* YOUR COMPRESSED AIR FACILITIES?

WRITE FOR THESE FREE BULLETINS ON JOY COMPRESSORS

JOY WG-9 • 15 to 75 Horsepower • 95.6 to 939 CFM

Single cylinder, single stage, double acting, water cooled. Joy vertical design saves space . . . fits right into plant expansion plans. Fourteen models. Bulletin shows cross-section diagram with construction and operation details.

JOY WN-112 • 60 to 150 Horsepower • 368 to 974 CFM

Two cylinder, two stage, double acting, water cooled. Joy pioneered the V-vertical design in 1936 . . . thousands of these units in operation. Nine models available. Bulletin gives complete details on construction and operation.

JOY WN-114 • 175 to 600 Horsepower • 1186 to 3896 CFM

Four cylinders, two stage, double acting, water cooled. Joy semi-radial design provides maximum capacity in very little space. Eight models. Bulletin gives complete construction details.

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.

EQUIPMENT FOR INDUSTRIAL PLANTS...FOR ALL INDUSTRY

WRITE FOR BULLETIN SET 156-15

AIR & GAS COMPRESSORS

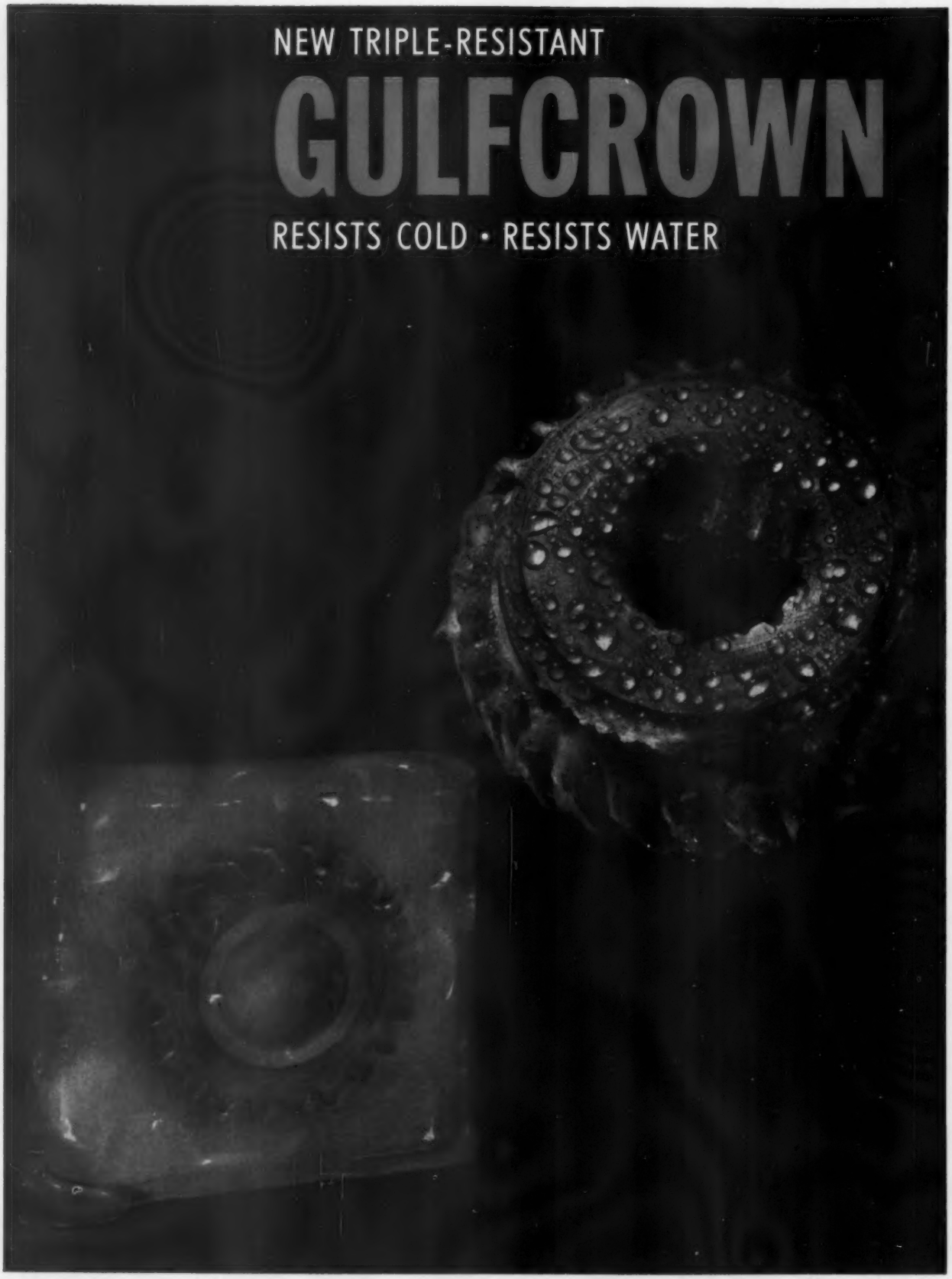
FANS AND BLOWERS

ELECTRICAL CONNECTORS

OIL FREE COMPRESSORS

WSW 16471-156

For more facts circle 515 on Reply Card


NEW TRIPLE-RESISTANT
GULFCROWN
RESISTS COLD • RESISTS WATER

Heat, zero temperatures, excessive water—new Gulfcrown works under conditions where many other greases fail!

This superior new lithium-base lubricant won't leak—has excellent high temperature performance. It pumps readily even at low temperatures. It sticks to surfaces even when washed with hot water. It can be applied from a centralized grease system or by grease gun.

Since its introduction earlier this year, Gulfcrown has proved itself an impressive money-saver—in steel, paper, and textile mills, and many other types of manufacturing plants. Gulfcrown's exceptional stability under adverse conditions reduces grease consumption. Its ability to serve many purposes simplifies lubricant storage and handling—avoids application errors. If you're looking for a grease you can use practically anywhere, Gulfcrown is it. Comes in N.L.G.I. consistencies 0, 1, 2 and 3. Call your Gulf sales engineer now, or send for free literature.

GULF OIL CORPORATION
1822 Gulf Building, Pittsburgh 30, Pa.

Please send 8-page folder on new Gulfcrown Grease.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

For more facts circle 516 on Reply Card

Moisture-laden hot-spot calls for some cool figuring!

Superior design of Louis Allis electric motors pays off under severe heat-humidity conditions

This paddle-agitator drive gets a steady bath of searing hot vapors from the trough below. Yet, the Louis Allis motor has given continuous and reliable service. Here are the special design techniques that make this possible:

Special attention to insulation—Louis Allis sponsors continuous research into new insulating materials. One example: Louis Allis engineers were first to combine Gilsonite with phenolics and alkyds. The result is a varnish with the highest degree of moisture, acid, and alkali resistance — extra-long life for all motor uses whatever your design problem.

Special care in manufacturing—Quality control of all materials . . . careful inspection . . . rigid test . . . all of these add up to the highest quality standards in the industry to assure you of continuous fine performance, dependability under any condition.

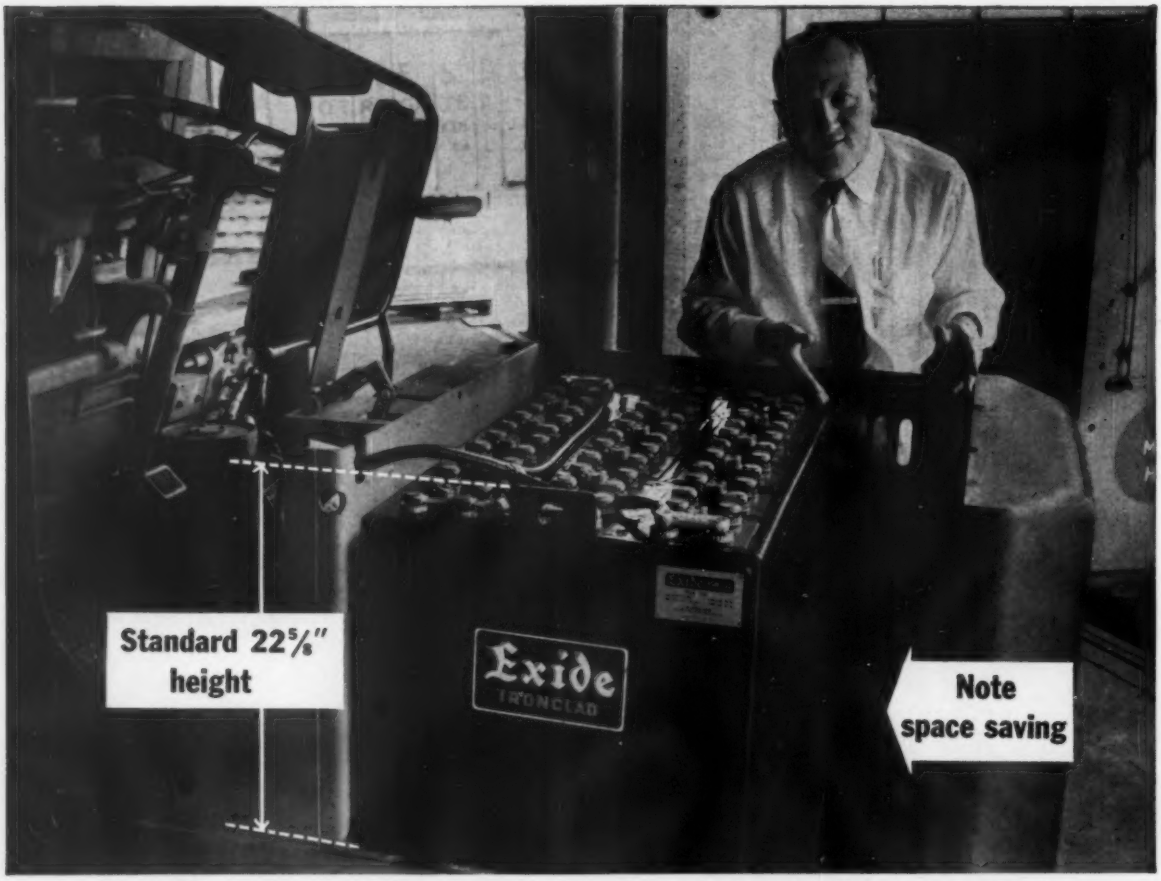
These and other Louis Allis extras—such as locked bearings for longer wear, positive lead identification for easier maintenance, and dynamically balanced rotor for quieter operation — could be the answer to your special design problems.

The complete story is in our Bulletin 1700. May we send it to you? Contact your nearby Louis Allis District Office or write The Louis Allis Company, 434 East Stewart Street, Milwaukee 1, Wisconsin.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE-SPEED DRIVES

For more facts circle 517 on Reply Card



Greater flexibility. A 5000 lb. capacity truck with a 648 amp-hr new TG Exide-Ironclad battery. Same truck could hold a 936 amp-hr battery for increased work capacity if needed. Or the 648 amp-hr battery could also be used on a truck as small as 2000 lb. capacity. This flexibility is possible only with Exide's exclusive new TG battery.

NEW TG EXIDE-IRONCLAD BATTERY PACKS SAME POWER IN SMALLER SIZE FOR LOWER COST

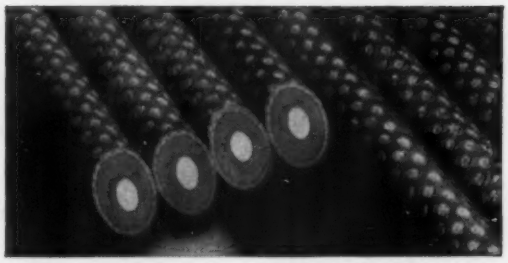
Improved design gives more power and life per dollar. Superior peak-load performance.

Here's the kind of battery economy that really counts: more power and life per dollar. The TG Exide-Ironclad is the most advanced and economical battery ever built for electric industrial trucks.

Every plate packs more power; fewer plates are required to perform a given duty cycle. That means you get a more compact battery with the *standard 22⅝ in. height*. It also means that, for a given capacity, the new TG costs you less. TG's armored porous tubing prevents practically any loss of active material; so even greater economy is gained as a result of its long, dependable service life.

More work from your trucks. The compactness of the TG means you can install more power in your trucks—thus, get more work from them. For a given size truck, TG can give you up to 44% more power than batteries you might otherwise use.

Only Exide offers you so much. When you order new batteries, get all the power, performance and life your dollar can buy. Get TG EXIDE-IRONCLAD. For full particulars about the extra productivity and longer life of the new battery, call your EXIDE Sales Engineer, or write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

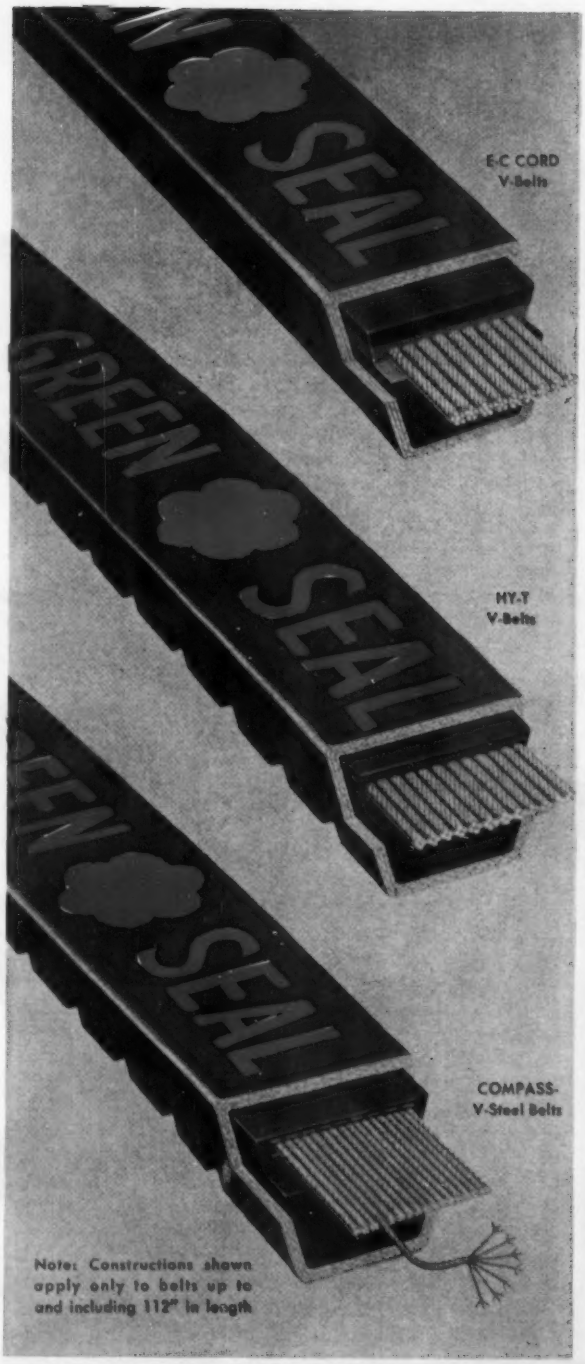


New, more porous armored tubing for positive plate. Eases current flow. Holds more active material. Boosts battery power. Corrosion resistant Silvium* grid insures long plate life.

*Exide's patented grid alloy

Exide®
THE ELECTRIC STORAGE BATTERY COMPANY

For more facts circle 518 on Reply Card



Why V-Belts with the Green Seal ?

The Green Seal is put on each Goodyear multiple V-Belt for *your* protection. For it's your sign of a belt with dimensional stability—something long sought but only recently achieved in a complete line of V-belts.

What does dimensional stability mean to you? It means belt length remains the same from factory to drive. The length you order is the length you get. Matched sets stay matched. And mismatching—the biggest problem in belting multiple drives—is now a thing of the past.

How was this dimensional stability achieved? Until recently, stable belt length was possible only with steel cable load carriers as developed by Goodyear. But now it is also accomplished with synthetic cord through the exclusive Triple-Tempered 3-T process that stabilizes length by careful tempering with Tension, Temperature and Time.

Triple-Tempering also gives you a stronger, more shock- and stretch-resistant belt. Add "balanced construction"—with each component of the belt designed to its job—and you have a smoother-, longer-running belt which means maximum, trouble-free horsepower hours at minimum cost.

DIMENSIONALLY STABLE V-BELTS
with the GREEN SEAL by

GOODYEAR

THE GREATEST NAME IN RUBBER

The Goodyear Tire & Rubber Company, Dept. 794, Akron 16, Ohio

Please send me more information about how V-Belts with the Green Seal solve the major problem in belting multiple V-belt drives.

Name_____

Company_____

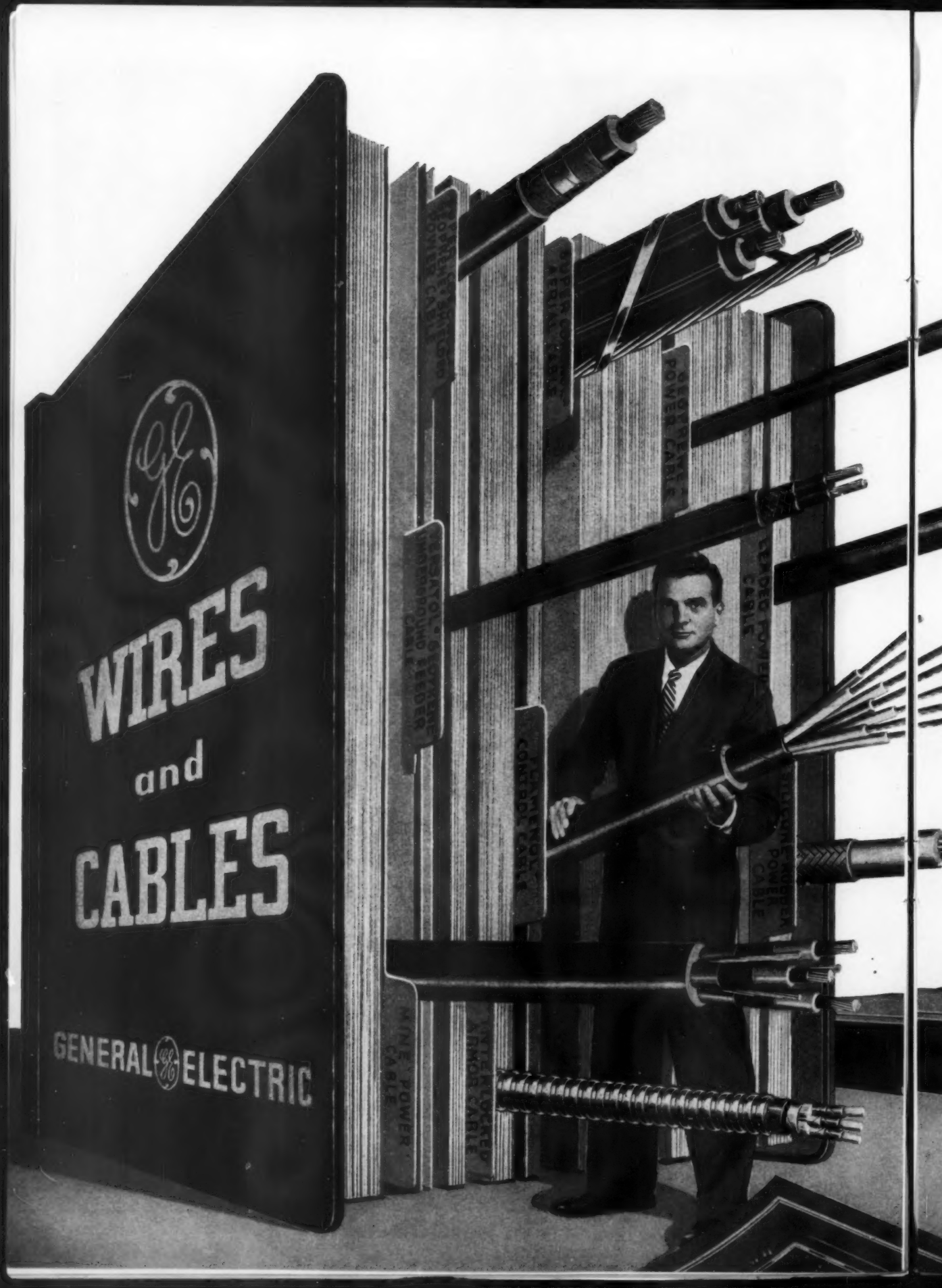
Street Address_____

City_____ **Zone**_____ **State**_____

Compass, E-C Cord, Hy-T, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

For more facts circle 519 on Reply Card

For more facts circle 520 on Reply Card →


WIRES
and
CABLES
GENERAL ELECTRIC
POWER CABLE
AERIAL CABLE
POWER CABLE
CONTROL CABLE
POWER CABLE
CABLE
CABLE
POWER CABLE

catalogs full of cables... but

which one is right for your job?

The problem of selection is one of the important reasons why many electric utilities and industrial plants work with General Electric wire and cable engineers in planning their electrical expansion and modernization programs.

Today, selection of the best wires and cables for your particular needs calls for consideration of a wide variety of factors ranging from standard requirements such as flame-, heat-, moisture-, and weather-resistance—to special constructions which withstand vibration, the electromagnetic effects of adjacent power cables—even the effects of atomic radiation.

General Electric's knowledge of the requirements of other basic components of power distribution systems—transformers, load centers, switchgear, etc.—has led to the conviction that the right cable plays an important part in satisfactory system performance.

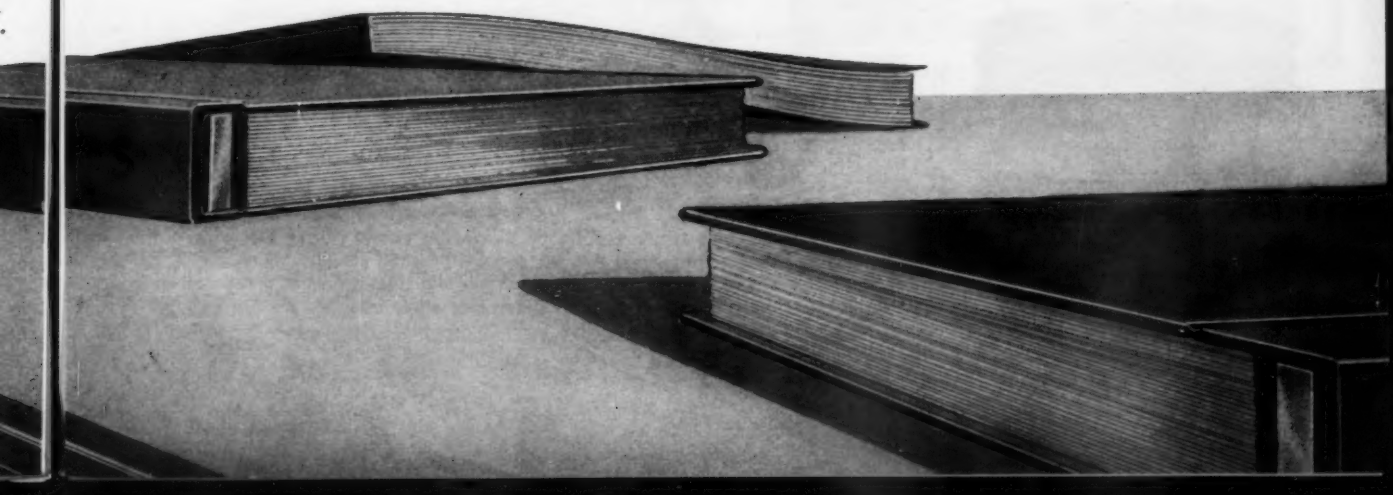
As a result, General Electric has developed hundreds of cables for just about every possible application. Thus, G-E engineers are not limited to one wire or cable for a given job but can suggest the most efficient and economical solution for the particular situation.

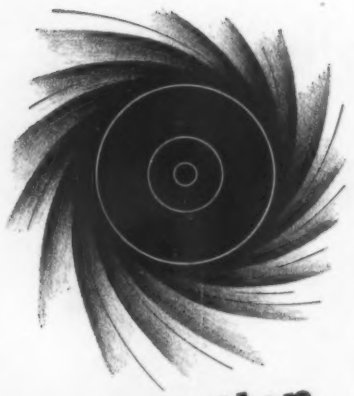
All this adds up to experience that can benefit you. Take advantage of it the next time you have a cable selection problem. For information on your specific wire and cable application or selection problem, see the G-E wire and cable specialist in your locality or write Section W201-1064, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC





lubrication at high speeds

These LUBRIPLATE Lubricants provide the all-necessary lubrication for those modern, high speed machines operating up to 30,000 revolutions per minute.

LUBRIPLATE
No. 205—A superior and protective lubricant for anti-friction and plain sleeve grease type bearings, operating at speeds in excess of 5000 R.P.M. Widely used for lubrication of high speed bearings on woodworking machines, textile spindles, grinder arbors, etc.

LUBRIPLATE
Nos. 0, 1 and 2 are highly specialized light fluid type lubricants with high film strength. Their characteristics are excellent at both low and elevated temperatures. May be applied by conventional means.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.

For more facts circle 521 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Cost of LP Gas and Gasoline

PLANT ENGINEERING:

"I recently read your article 'Certified's Big Switch to LP-Gas,' on page 114 of your June, 1957 issue. In this article you make no mention of fuel economy. Gallon for gallon, how does LP compare to gasoline?" *Ralph T. Bishop, Plant Manager, Lock Joint Pipe Co., East Orange, N. J.*

► The following extract from an article by F. E. Selim, of Phillips Petroleum Co., in the August, 1957 issue of Butane-Propane news, may be of interest:

"Because of the difference in efficiencies in heating values of the fuels and differences in efficiencies of the engines in which they are used, there is a significant difference in the amount of fuel which the engines will use to do the same job.

"Experience tells us that because of this difference in fuel consumption, LP gas is worth about two-thirds as much as diesel fuel and about 85 per cent as much as gasoline in heavy duty service. In other words, wherever the total cost of 100 gal of LP gas (including all taxes and fees) is equal to or less than 85 gal of gasoline or 66⅔ gal of diesel fuel, the LP gas engine will be the logical power plant to use."

We shall be happy to have comments from readers who have also obtained any cost comparisons on the use of LP gas and gasoline.—*Editors.*

Compressed Air Piping

PLANT ENGINEERING:

"Would it be possible for you to furnish us with two copies of the article which appeared in the July issue of PLANT ENGINEERING entitled 'Sizing Pipe for Compressed Air'?" *W. F. Stadler, Advertising Manager, C. A. Norgren Co., Englewood, Colo.*

► Tear sheets of this article which appeared in our July, 1957 issue, on page 96, have been sent to Mr. Stadler with compliments of the editorial department. —*Editors.*

Operating Costs Study

PLANT ENGINEERING:

"An item appeared on page 40 of the April, 1957 issue of PLANT ENGINEERING regarding a study on operating costs of office buildings, made by the Minneapolis-Honeywell Company.

"I would appreciate receiving a copy of the release, or your referring me to the proper people at Minneapolis-Honeywell from whom I could obtain a copy." *J. T. Maiello, Building Construction Dept., International Business Machines, Poughkeepsie, N. Y.*

► For further information on the study of costs connected with operating more than 600 office buildings, we suggest readers write to Mr. Paul Hines, Jr., Public Relations Dept., Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave. So., Minneapolis, Minn.—*Editors.*

New Tanks for Old

PLANT ENGINEERING:

"Please send us more information on 'Tank Within a Tank' mentioned in your June, 1957 issue." *E. C. Badger, Inspection Engr., Neches Butane Products Co., Port Neches, Texas.*

► This item about giving new plastic linings to old tanks, appeared in the Operation and Production section of the magazine. The technique was developed by Haveg Industries, Inc., 900 Greenbank Rd., Wilmington, Del. —*Editors.*

Information Requested

PLANT ENGINEERING:

"Please send us more information about the hydraulic puller 'Holl-O-Ram' as shown in your May, 1957 issue.

"We are most anxious for this information and would appreciate your prompt attention to this matter." *T. L. Hankins, Condo Electric Co., Chicago, Ill.*

► An article about this hydraulic puller, used for various shaft pulling jobs, appeared on page 141 of the May issue. We have passed this request for additional information to the manufacturer of the equipment.—*Editors.*

Coil Winding Mechanism

PLANT ENGINEERING:

"We would like information on various automatic traversing machanism to control the winding of wire on spools. The mechanism may be mechanical, hydraulic or electrical.

"We are seeking those mechanisms where the pitch of the wire can be varied and the mechanism instantly reversed while in operation.

"We would appreciate any design

$$Ca^{++} + Na_2Z = CaZ + 2Na^{+}$$

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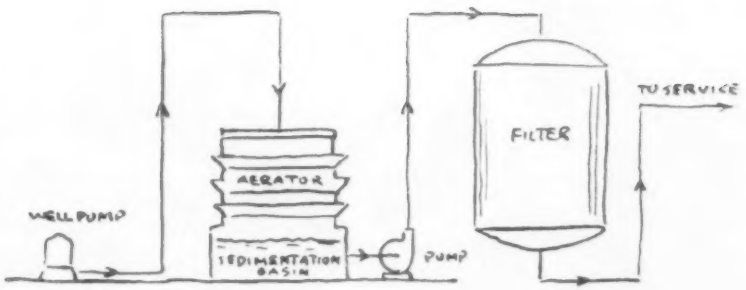
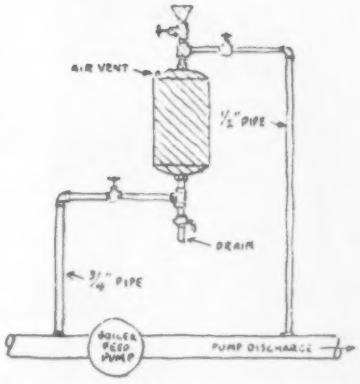
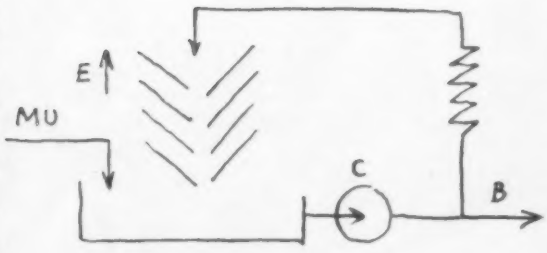




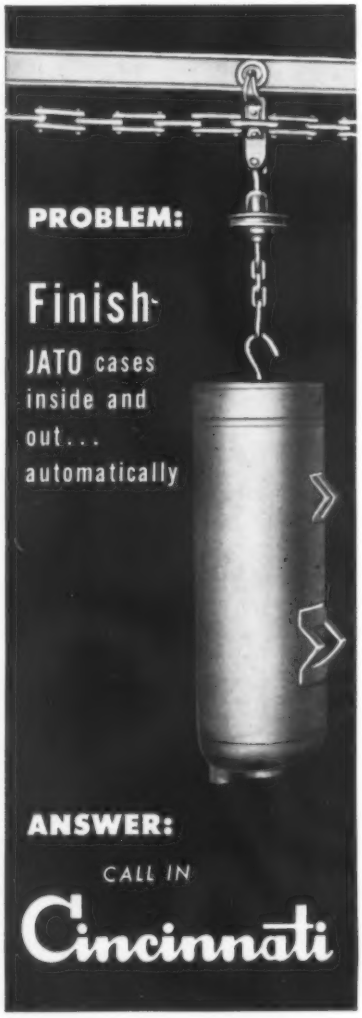
$$V = \frac{18.5D^2(S_1 - S_2)}{Z}$$

$$\frac{x}{m} = KC^{1/n}$$

any way you figure it, the best solution to your water problems is . . .



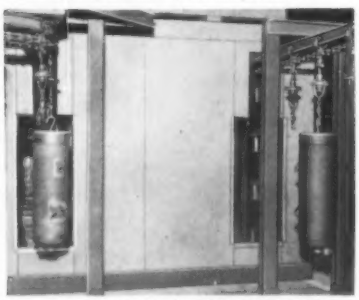
BETZ LABORATORIES INC., Philadelphia 24, Pa.



JATO cases at Phillips Petroleum move continuously from cleaning through painting to the bake oven . . . hang vertically on indexing conveyor to rotate as they are painted—inside and out—in just two automatic operations.

Let CINCINNATI expedite your cleaning and finishing. For free survey, write today!

CINCINNATI CLEANING and FINISHING MACHINERY COMPANY
2023 Hageman St., Cincinnati 41, Ohio



For more facts circle 523 on Reply Card

BACKTALK— FORETHOUGHTS

material or literature on commercial mechanisms you might have." *John G. Neff, Rea Magnet Wire Company, Inc., Fort Wayne, Ind.*

▶ The names of several manufacturers of spool and coil winding equipment have been forwarded to Mr. Neff. —*Editors.*

Cathodic Protection

PLANT ENGINEERING:

"In your May, 1957 issue, on page 138 is the statement: 'As is generally known, if the pipe surface or metallic casing is strongly cathodic to its surrounding enveloping material, an electric current will flow . . . . . The stronger this current flow, the faster metal is removed from the piping or outer casing and the sooner local failure will occur. . . .'

"The general knowledge with which I am acquainted would concede current flow would be the result of a strongly cathodic area and that there would be an equal current flow at the anodic area. It would be more concerned with the location and size of the anodic area and the strength of the current flowing there-from to the surrounding and enveloping material, as this is where the metal from the pipe or outer casing would be removed, and where local failure will occur.

"On page 139 of the same issue the statement: '. .the corroding metal always passing into solution at the anode. .' is made." *K. D. Wahlquist, Southern Union Gas Company, Dallas, Texas.*

▶ Mr. Wahlquist's letter was forwarded to the author, Mr. Ernest M. Stolberg.

Here are his comments:

"I am sorry to disagree with you, but I must hold to my statement in the article. According to my reference (Dr. Shepard, Corrosion Expert, formerly with the U. S. Bureau of Standards) the point or points where current leaves the metallic casing (athodes) are where the parent metal of the casing goes into electrolytic solution with surrounding ground water. The anodic points will tend to cause a disposition of minerals dissolved from contagious ground or backfill, if anything. Reversing the current flow at these points of high cathodic potential to ground is one of the methods employed in arresting this type of corrosion.

Unfortunately, I do not have a copy of the May issue at hand, since I changed residence a couple of months ago. The excerpted copy of my article which the editor of PLANT ENGINEERING sent me showed that the article appeared on pages 136, 137 and 138. The reference that you mentioned in your last paragraph from page 139 does not appear anywhere in the copy of my article which I received."

Dust Collecting Equipment

PLANT ENGINEERING:

"We would appreciate receiving any additional information you may be able to forward to us on the 'Microdyne'

dust collector." *W. E. Grose, Plant Engineer, American Cyanamid Co., New York, N. Y.*

▶ A story about the field testing of prototype models of the Microdyne dust collector appeared on page 114, of our July, 1957 issue. Reader requests for more information about this equipment have been forwarded to the company concerned. —*Editors.*

Structural Design

PLANT ENGINEERING:

"I would like to request a reprint of an article seen in your publication.

"The article is Part I, II and III of B. A. Wasil's article 'Structural Design of an Industrial Building.' If reprints of this article are available, I would appreciate very much having a copy." *J. S. Chandler, Drafting Supervisor, Colorado Insterstate Gas Co., Colorado Springs, Colorado.*

PLANT ENGINEERING:

"Please send me a tearsheet of Part III of 'Structural Design of an Industrial Building' which appeared in the August, 1957 issue of PLANT ENGINEERING." *W. H. Siefert, Supv. Plant Layout, Westinghouse Electric Corp., Transformer Div., Sharon, Pa.*

▶ We are glad to forward tearsheets requested. They appeared in our April, June and August, 1957, issues. At a later date, these will appear in booklet form.—*Editors.*

"LYON QUALITY DESIGN *makes* THE DIFFERENCE!"

Patented LYON Clip and Stud Design provides fast, easy assembly and adjustment without use of tools!

STEEL SHELVING, for example. At a glance, all steel shelving may look very much alike but there's a world of difference—in ease of assembly, adjustability, rigidity and durability. That's why you should check Lyon before you buy.

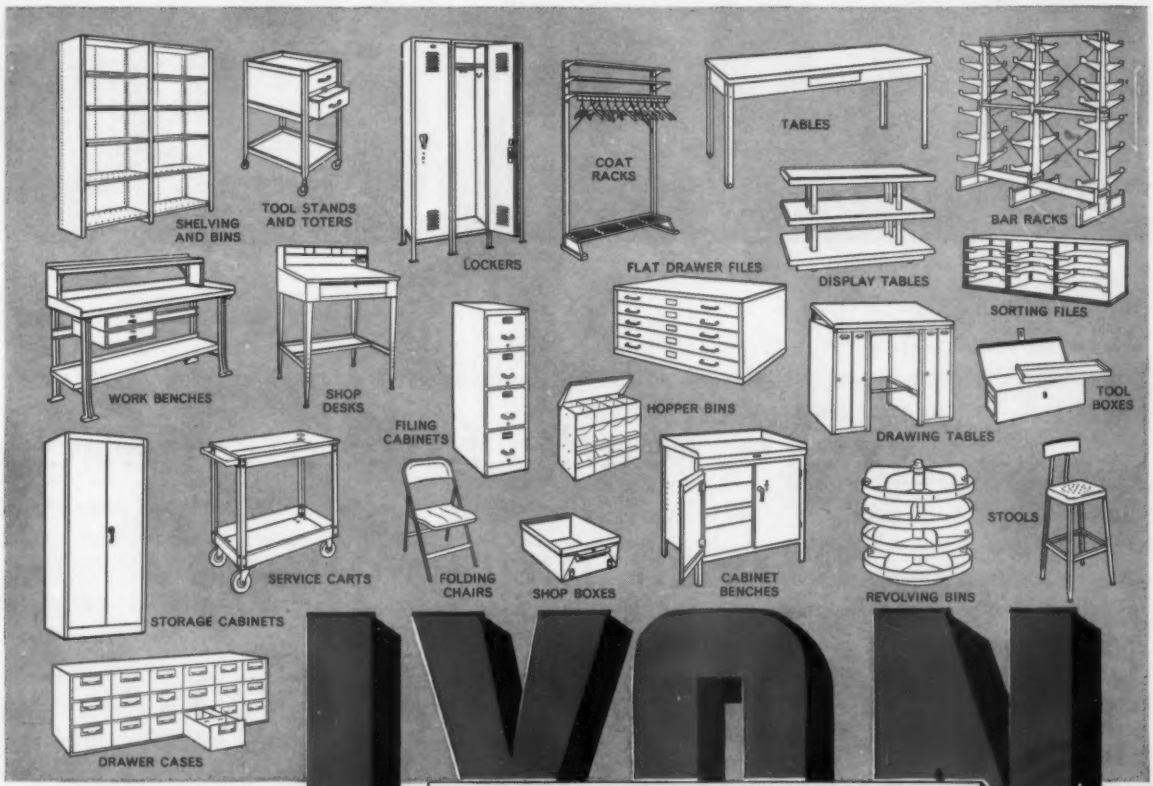
This same quality design makes the difference in every one of the more than 1500 standard Lyon items, a few of which are shown below.

CALL YOUR LYON DEALER. He offers the world's most diversified line of steel equipment. Equally important, he can show you how to get the most for your money in terms of saved time and space.

We can manufacture special items to your specifications.

LYON METAL PRODUCTS, INC.

General Offices: 1091 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities



LYON®

STEEL EQUIPMENT

OVER 1500 ITEMS
for Business, Industry, Institutions

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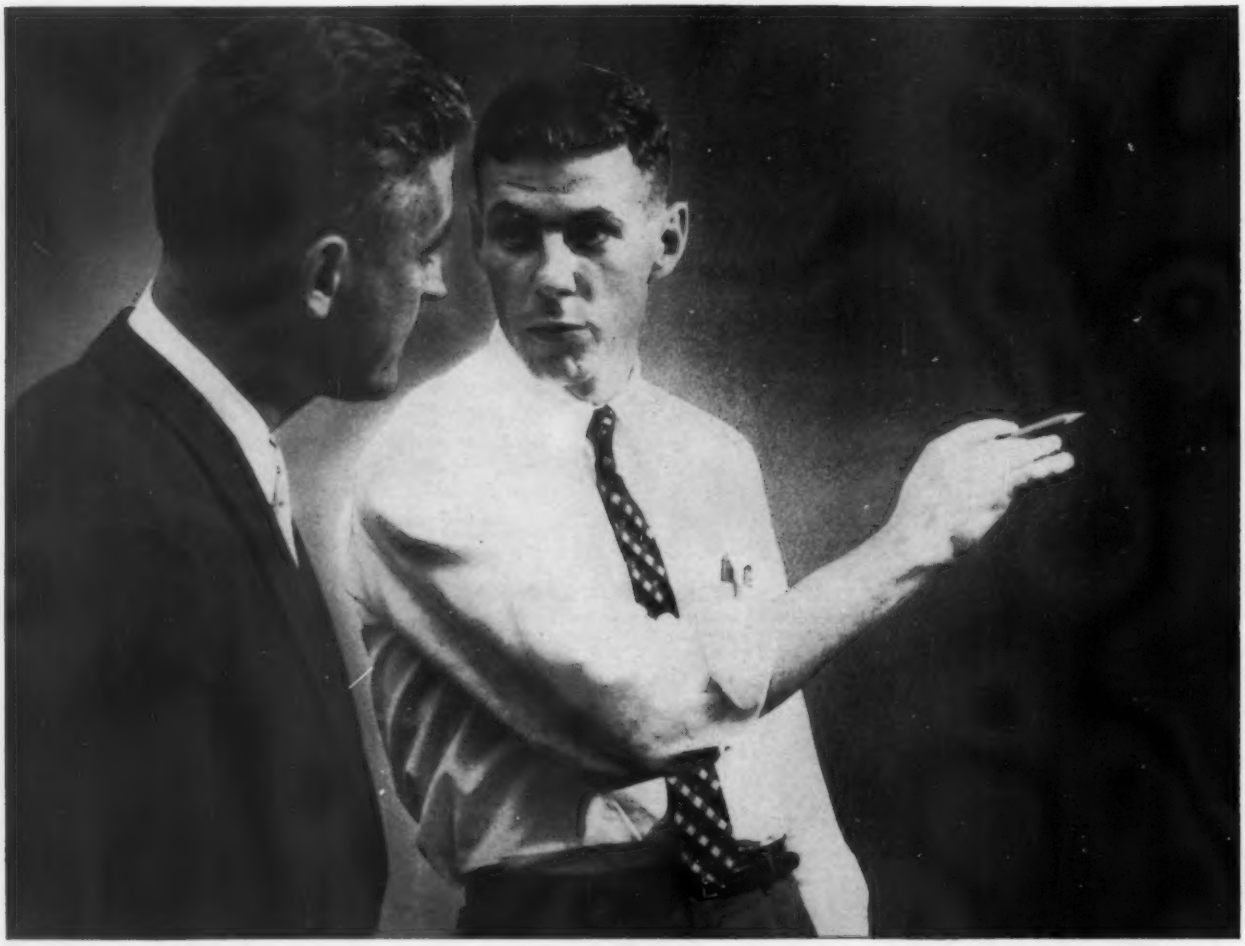
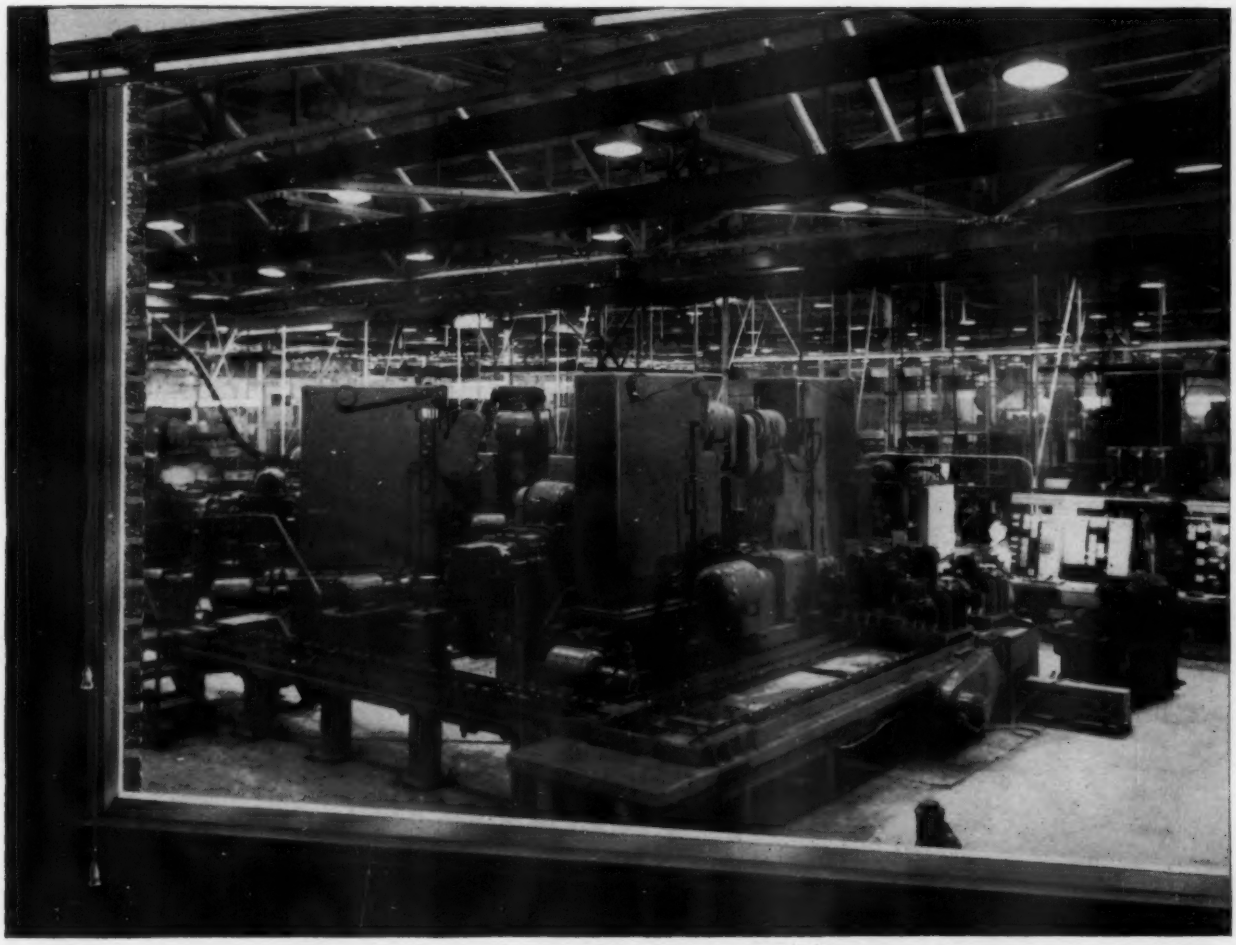


"We're ready for automation with high voltage power distribution"



When you're planning cost reduction with improved machinery and automated processes, power distribution in the plant is critical. Too often expensive machine tooling can't perform as planned because of voltage fluctuations, inadequate overload protection, or other distribution system limitations. A recent survey of plants in one metropolitan area shows that 88 percent have electrical problems that interfere with production.

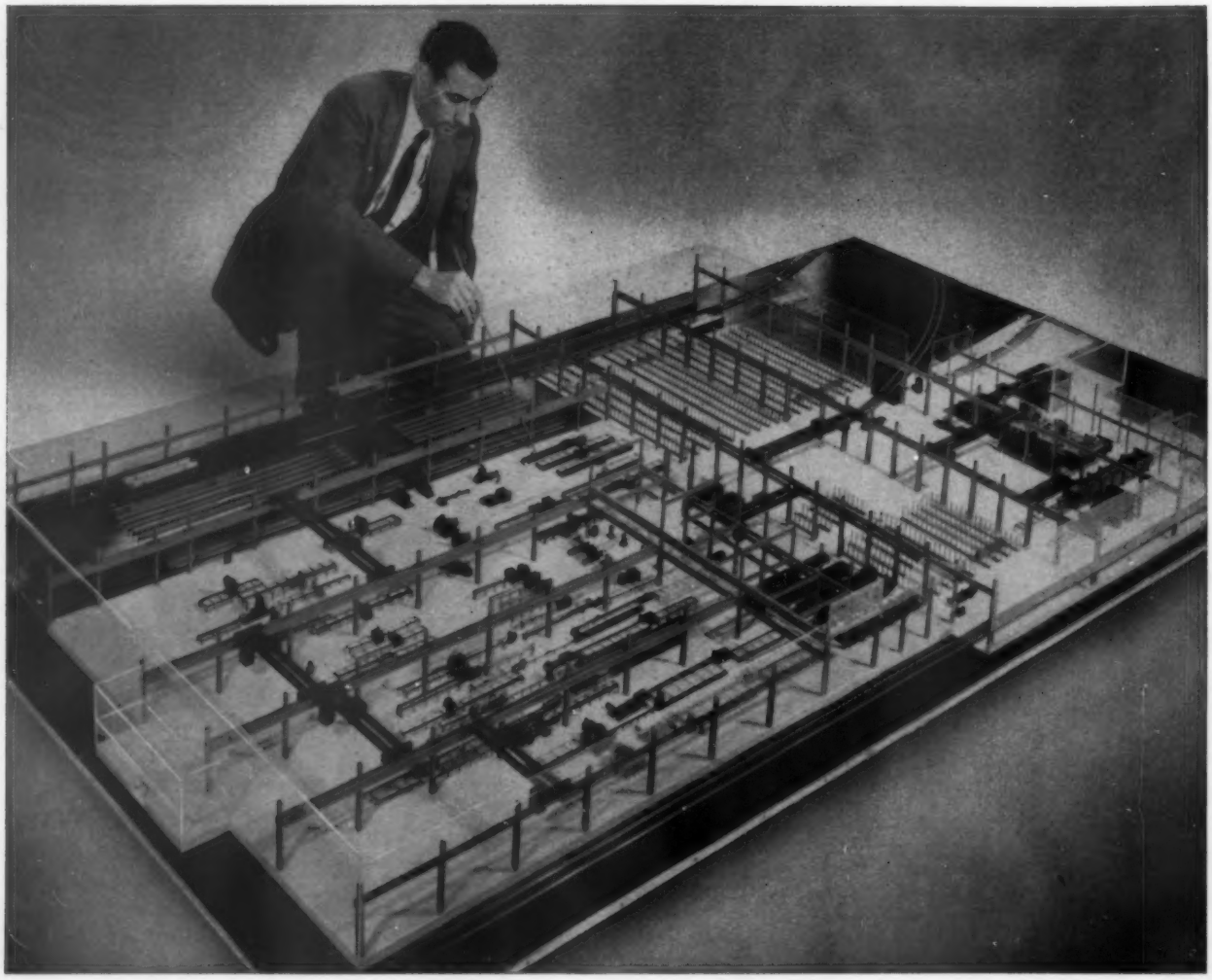
These problems won't exist if you prepare for production improvements with adequate power distribution. For example — if your plant load exceeds 1000 kva, or will exceed it in the future, plan for distribution at primary voltages . . . 4160, 6900 or 13,800 volts. It will result in cost savings, greater production flexibility and efficiency, compared to distribution at plant utilization voltage.

Plan ahead! After all, your total production depends upon the electric power distribution system which represents only 5 to 15 percent of the total plant investment. Ask your Westinghouse representative to help you plan for improved production through the use of higher voltage power distribution.

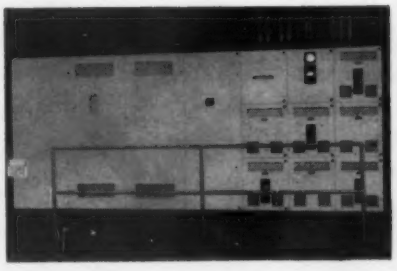
YOU CAN BE SURE...IF IT'S

Westinghouse

There's profit in planned power...



Westinghouse Shelterfor-M outdoor metal-clad switchgear offers complete independence from weather for maintenance. All work can be done from the inside.



Westinghouse power centers are located at the load. They are geared for today's production with "room-to-grow" flexibility for tomorrow's plant expansion.

Westinghouse Ampgard* high-voltage starters co-ordinate large-motor overload protection, short circuits and personnel protection; BAL-type fuse line-protection ratings to 400 amperes, fault interrupting capacity to 50,000 kva.

*Trademark

POWER-UP with Westinghouse

Show management more ways for cost reduction... with a power-system plan

Take a look at the fast-growing electrical needs of manufacturing in your plant. It's only average if kilowatt-hour consumption has jumped 8 percent each year for the last 10 years. The larger your load, the more you save with higher primary voltage.

Higher voltage, power-center distribution systems offer you . . .

1. Good voltage regulation — full power for production
2. Lower power bills
3. Lower investment in conductors.
4. Probable reductions in apparatus-and utilization-equipment costs

Your Westinghouse salesman can help with experienced counsel in selecting the right system and equipment. Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pa.

MP-3056

Characteristics of Distribution Systems

TYPE OF SYSTEM	Flexibility	Service Continuity	Regulation	Efficiency	Operation and Maintenance Cost	Initial Investment
Modern Simple Radial	F	F	D	C	A	A
Primary-Selective Radial	D	D	D	B	A	B
Simple Network	A	A	A	C	B	E
Simple Spot Network	C	A	A	D	D	E
Primary-Selective Network	A	A	B	A	C	D

LEGEND

A. . 91-100% C. . .71-80% E . . .51-60%
B. . 81- 90% D. . . .61-70% F . . .41-50%

Approximate relative standing of five basic distribution systems. For detailed analysis of your system, consult your Westinghouse salesman.

YOU CAN BE SURE...IF IT'S

Westinghouse

Westinghouse DB circuit breakers provide protection in less space. They contain a multi-characteristic tripping device to prevent false shutdowns, 1) long-delayed tripping on temporary overloads, 2) short-delay tripping on larger overloads, 3) trips instantly on short circuits.

New Westinghouse control centers with completely interchangeable 9⅓" and 14" modular dimensions can save as much as 40 percent in installation costs over decentralized methods of mounting motor control. Save time in inspecting control and reduce servicing problems.

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Easy Loading With Low Underclearance

UNDERCLEARANCE PROBLEM on the shipping dock of the Century Electric Company, St. Louis. Mo., was solved by the use of a magnesium combination ramp-dock board. Low underclearance on their walkie trucks plus a larger than average height differential between the dock and carrier, prevented use of a standard dock board.

To handle the eight-inch height differential, an ordinary board would have too large a crown to permit travel of low underclearance walkie trucks. On the other hand, a long ramp suitable for low underclearance trucks would be bulky and hard to handle.

The use of this combination ramp-dock board, provides an efficient solution. Built in two separate parts and fabricated from lightweight magnesium, it can be moved and positioned by one man. It provides the long gentle slope needed by the low underclearance equipment shipped by the company.

The unit, which consists of a ramp section which rests on the dock and is permanently elevated at one end, can handle axle loads up to 12,500 lb.

Ramp-dock board solves a loading problem at the Century Electric plant

The dock board bridges between the ramp and is held in place during loading by position spacers. *From a release of Lite-Line Metal Div., Copperloy Corp., Cleveland, O.*

Continuous Wire Plating

THIN, EVENLY DEPOSITED triple-plating coat is applied to hundreds of feet of wire an hour in a new continuous-type wire plating system at Wilbur Driver Co., Newark, N. J.

The system is used primarily for silver plating fine strands of manganese-nickel wire, approximately 0.036 in. in diameter, with a nickel-silver deposit, 0.0009 in. thick. Fully automatic, it draws four strands of wire at a time off a "take-off" stand through 12 cleaning, plating, rinse and drying tanks, then rewinds it.

The new continuous plating system is used mainly for electron tube wires.

Before acquiring the automatic plating system, the company had its wire rod silver-plated by an outside processor. Plating was done by a spiral method, where large coils of wire are immersed in solutions in a rotating process.

The job was moved in-plant and to the continuous method for several reasons:

1. The company believes that continuous plating provides better control for plating the entire surface of the wire than a batch method.
2. Considerable economy is derived by in-plant plating than by subcontracting the work.

(Continued on page 42)

Railroad Roundhouse Converted To Handle Tank Car Lining Operations

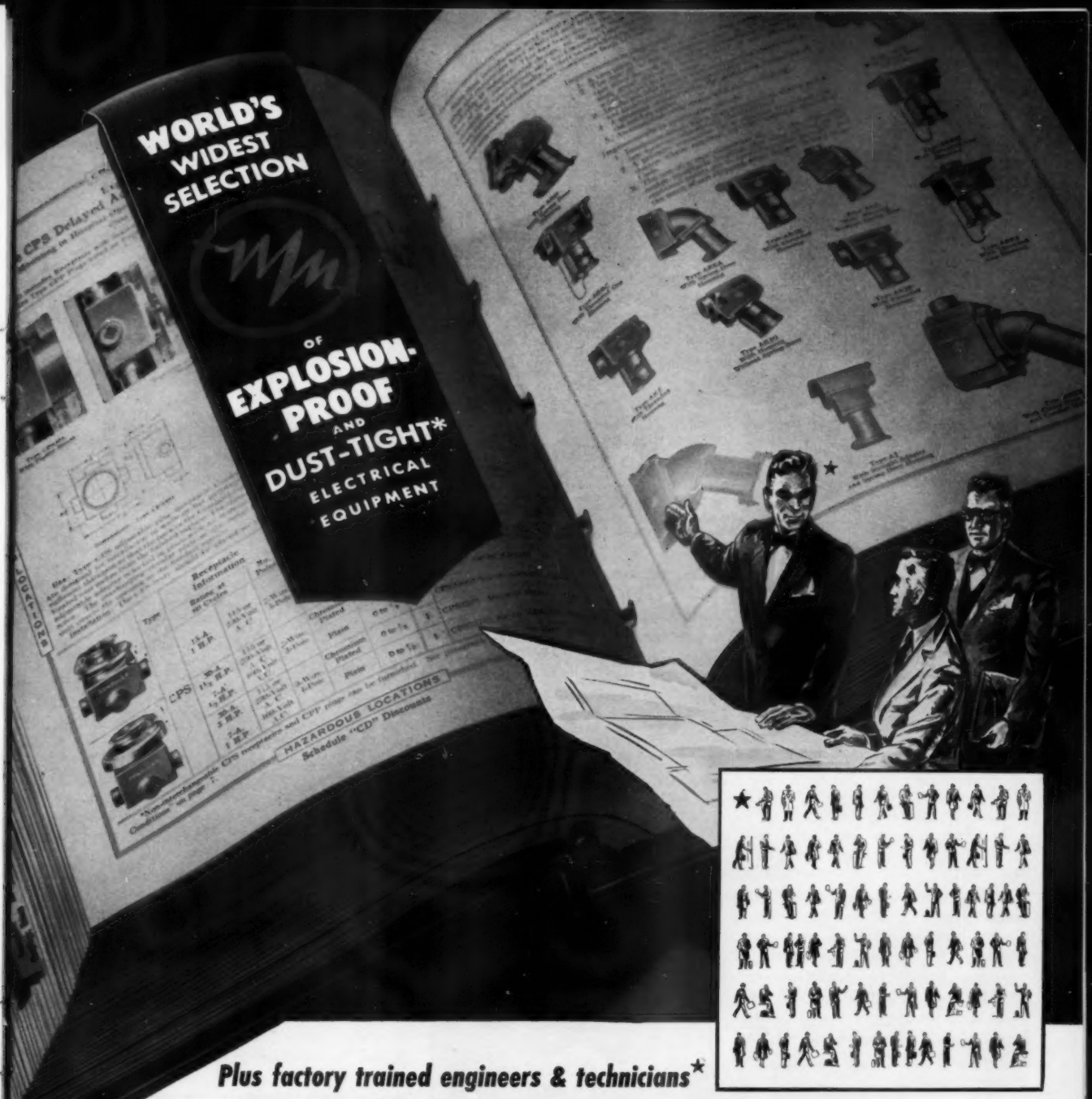
A FORMER RAILROAD roundhouse, fed by 17 sets of tracks, is being used to handle tank cars that are to have protective phenolic and epoxy coatings applied to the interiors. Located in Melrose Park, Ill., the roundhouse can handle 30 cars at a time. Monthly capacity is 90 treated tank cars.

To process the cars, interiors are usually sandblasted, then plastic resins are applied by spraying. The coatings are then baked by injection of hot air.

Old roundhouse houses tank lining operations, handles 30 tank cars at a time

While the roundhouse offered a generally ideal situation for the work, the move, made in stages between 1952 and 1955, presented some conversion problems. It was necessary to floor over many of the pits in the shop area and to install natural gas for baking. Space had to be converted into offices, a laboratory, a mixing room and a blasting room.

Prior to the move to the roundhouse, work was carried on in a conventional industrial building. The new location has enabled our company to increase this operation 200 per cent, at the same time reducing downtime on tank cars to a minimum. *From a release of Lithcote Corp., New York, N. Y.*



Plus factory trained engineers & technicians to assist you in selecting the types best suited to your needs*

There are more than 17,000 items in the Crouse-Hinds line of Condulet® and floodlighting equipment. Each is designed with some specific advantage or quality that makes it best suited for a particular application.

Of course, no engineer, electrician or contractor with a regular job to do, could possibly keep in mind all the pertinent data and information concerning each of these items. That's why Crouse-Hinds maintains a factory-trained field staff of 80 graduate E.E.'s and technical men.

Their job is to confer with the users of Crouse-Hinds equipment and to point out the reasons why certain Condulet equipment or floodlights are better suited for a particular job than others. With a broad grounding in the details of the National Electrical Code and a trained alertness for spotting explosion hazards in unsuspected places, they make a consulting or factory-engineer's job less onerous.

Their service is prompt and without obligation. Naturally they usually work on jobs of sufficient size to merit top-level attention, but even a small job with a large problem gets the same careful appraisal. If you'd like to talk or correspond with such a specialist, just write, wire or phone.

CROUSE-HINDS COMPANY

*Dust-ignition-proof

Main Office and Factory: Syracuse, N. Y.
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PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

3. The system can also be used for nickel or copper plating, Wilbur Driver reports, although so far it's been used only for silver. By changing the three plating tanks in the system, it can be used for other wire plating operations.

4. The operation was also moved

Close-up view of contact and tank seal mechanisms at electro-cleaning tank

in-plant to give the company better control over delivery dates.

In this system, current is fed into each electrolytic tank at the ingoing end. At this point are three sets of circular sheaves—two idler and one contact for each of the four wires. These grooved sheaves are positioned so that the wire exerts a slight pressure against the contact sheave, establishing a positive contact. All three sets of sheaves rotate at the same speed as the wire travels, maintaining a constant contact and current supply. Current passes from rectifier to contact sheave (made of copper, brass or a similar current carrying material) and then to the wire.

Every tank in the system is provided with leak-proof seals at all points where wire enters and leaves the tank. These seals are mounted on sliding gibs, so that wire inlets and outlets can be raised above the solution level in the tank, if wire is not being run through that processing line.

Power control at the five electrolytic tanks in the system is provided by heavy duty, self-contained type selenium rectifiers. At cleaning and strike tanks, 15 amp. 12 volt units are used. A larger 50 amp, 10 volt unit is installed for the silver plating tank.

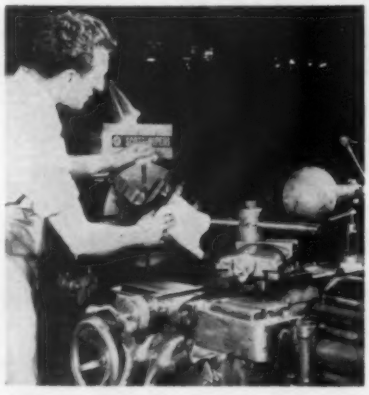
Each unit is installed directly over the tank it services and within hand's reach of the operator.

The twelfth tank in the system contains a forced air drying system to prevent spotting of the wire after it has been plated. The dryer is divided into two compartments. The lower section contains a heating coil, the upper section is divided into four tunnels through which the wire passes. *From a release of Hanson-Van Winkle-Munning Co., Matawan, N. J.*

Keep it Clean

FOR THE PAST three years, Crown Cork & Seal Company has improved safety conditions at its Philadelphia plant by providing employees with industrial paper wipers for can manufacturing and maintenance operations. Replacing textile wipers with disposable paper wipers for many general purpose applications also has helped reduce plant wiping costs 20 per cent annually.

The wipers are used mainly for personal wiping applications and for general maintenance repair work. By using a clean paper wiper for every personal application, hazards of cuts and scratches are eliminated.



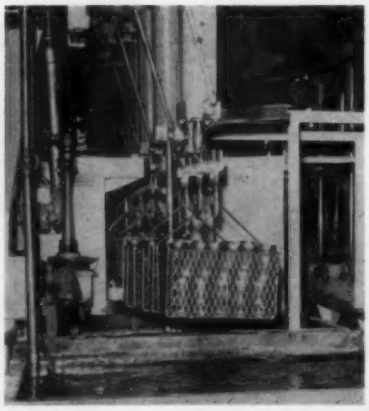
Metal chips are wiped from lathe chuck with readily disposable paper wipers

Baled waste and cloth wipers used previously for personal wiping frequently contained metallic splinters which resulted in skin cuts and scratches in many instances.

Boxes of wipers are distributed to personnel as needed and the time-consuming chores of sorting, counting and bundling dirty wipers for the laundry are eliminated. Used paper wipers are discarded in trash barrels spotted conveniently around the plant. Each day, the oil-soaked and soiled paper wipers are burned, thus eliminating a fire hazard and further safeguarding personnel. *From a release of Scott Paper Co., Chester, Pa.*

Automatic Dip for Small Parts

DIP PROCESSING MACHINE which indexes automatically for multiple-stage finishing operations is in use



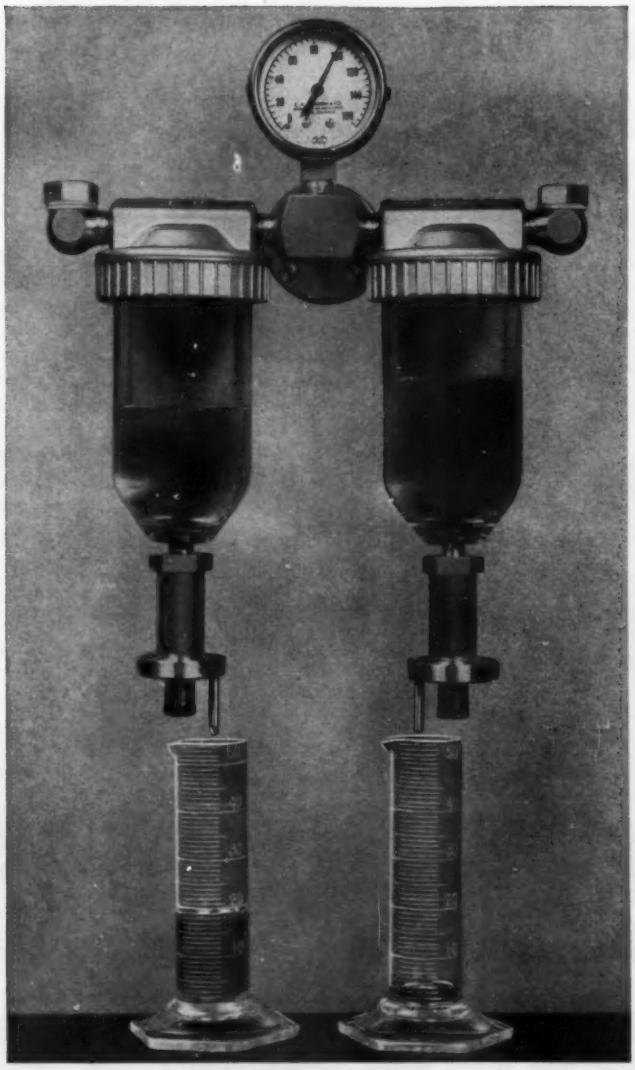
Two baskets of parts can be dipped into automatic machine every two minutes

at Dresser Industries, Inc., Wellsboro, Pa. It permits the use of shorter dip tanks, dipping baskets of parts in a series of tanks as baskets travel suspended from a single, closed-loop monorail conveyor. The operation is entirely automatic, from the first dip through conveyor unloading.

Two baskets of parts can be completely processed through nine stages, every two minutes. These parts, which demand an extra heavy zinc phosphate coating as rust preventive, require a total dip of 11 minutes in the various solution tanks.

The space-saving tanks are only long enough to permit entry and processing of parts, thus eliminating the long, space-consuming dips and rises characteristic of monorail conveyor systems. As the conveyor indexes in transit, the baskets of parts are automatically submerged for processing; when the conveyor again indexes, the baskets are raised and positioned for the next cycle.

The automatic indexing is actu-



ANTILEAK DEMONSTRATION

Suntac oil in one chamber, your present hydraulic oil of the same viscosity in the other. Both oils are forced out through sintered bronze bearings. In this photograph, pressure of 100 psi caused a straight mineral oil to leak out four times faster than Suntac.

SUNTAC CUTS HYDRAULIC OIL LOSS AS MUCH AS 75%

See this demonstration in your plant

Take about five minutes at your own desk to learn how Suntac® oils stay put in hydraulic systems . . . reduce oil loss through loose joints and worn fittings.

Match Suntac against the hydraulic oil you're now using—see how the exceptional non-gummy antileak characteristics of Suntac can reduce your oil losses as much as 75%. *Some users have even reported savings of 90%.*

Call Your Sun Representative

Have him arrange with a Sun Lubrication Engineer to give you and your staff a private demonstration. For further information on the uses of Suntac in hydraulic systems and in general lubrication, write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. **Py-10**

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Another great product of GPL precision!

ii-TV 500

From GPL, developers and manufacturers of the famous "150" the compact closed-circuit TV camera that produces the finest quality pictures . . . from the makers of the "152" Ruggedized the TV camera that withstands shocking vibrations, blows and extremes of temperature...comes the new, versatile *ii-TV* 500...again the finest in its class.

economical – will soon save its cost in many applications

single unit system – with controls right at the camera

add-on feature – a full line of easy-to-add accessories and remote controls

For further information or a demonstration, write Mr. N. M. Marshall, General Precision Laboratory INCORPORATED 65 Bedford Road, Pleasantville, N.Y.

GPL

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PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

ated by a floating cam which operates air cylinders spaced 48 in. on center throughout the length of the conveyor system. Air cylinders are supplied from a single flexible manifold attached from cylinder to cylinder, which is in turn supplied from a rotating hose in the center of the system. Volume of air required for specific operations is determined by the size of the air cylinders. An electric timer controls the indexing operation of the conveyor. *From a release of Cincinnati Cleaning and Finishing Machinery Company, Cincinnati, Ohio.*

Glass Block Curtain Wall

USE OF GLASS BLOCK curtain walls has meant a reduction of 95 per cent in the use of artificial light at Sud-

Curtain wall of glass block in tool room allows operation most of time without need for additional artificial lighting

bury Motors, Ltd., Sudbury, Ont. In addition to the savings in the cost of lighting, supplementary lighting fixtures were eliminated, a $400 annual wall painting bill was eliminated and wall cleaning was reduced.

The north wall, which is the main source of light, is 30 ft high and consists of glass blocks. Blocks are of two types; a light-diffusing type for use below eye level, and a light-directing type used above eye level. The latter directs the light to the ceiling where it is reflected towards the floor. Individual clear glass

Some insulations feed a fire . . .

FOAMGLAS®

INSULATION won't burn!

—and only inorganic FOAMGLAS insulation offers all these added benefits . . . waterproof and vapor-proof (closed glass cell structure) . . . dimensionally stable . . . high compressive strength . . . vermin-proof . . . easy, economical to handle and install. Write for detailed literature.

FOAMGLAS is listed by Underwriters' Laboratories, Inc. under Label Service.

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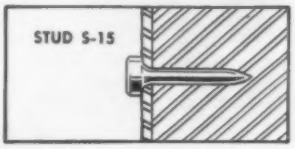
For more facts circle 529 on Reply Card

Just one of *101* Stud Driver uses!

No outside power source required—

Fasten duct straps to concrete or steel in seconds with the Remington Stud Driver



Fastening duct straps to steel or concrete is easy with a Remington S-15 Stud and a 22 caliber Power Load. No bolts or washers needed... pull-out resistance—over 2 tons!

Squeeze the trigger and the job's done—without pre-drilling! This cartridge-powered fastening tool sets both ¼" or ⅜" diameter studs arrow-straight into steel or concrete . . . up to 6 studs a minute, either size. Barrel change-over takes only 90 seconds *right on the job*. Over 40 Remington Studs to choose from, plus 22 and 32 caliber Power Loads scientifically graded to furnish *exact* power you need. Use the tool for light, medium and heavy-duty fastening—and save time and money on every installation!

TAKE ADVANTAGE of this modern fastening tool in your own work. Clip and mail coupon for valuable booklet.

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STUD DRIVER

Industrial Sales Div., Dept. **PE-10**
Remington Arms Company, Inc.
Bridgeport 2, Conn.

Please send me your free booklet which shows how I can speed the job and save with the Stud Driver.

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

ventilators are used at two levels along the 150-ft long wall. *From a release of Pittsburgh Corning Corp., Pittsburgh, Pa.*

Lead Piping for Chemical Lab

LEAD PIPE has been used for the laboratory drainage system in the new chemical laboratory building of

Lead piping, supported by angle irons, connect the laboratory tables to the acid-resistant cast-iron drainage lines

Phillips Research Center, Bartlesville, Okla.

Long lengths of lead pipe, supported on angle irons, connect the laboratory tables to the acid-resistant cast-iron drainage lines. The traps were made in the lead pipe itself, so that a minimum number of special fittings and joints were used. Where joints in the lead pipe were needed, they were made by burning. *From Lead, published by Lead Industries Assn., New York, N. Y.*

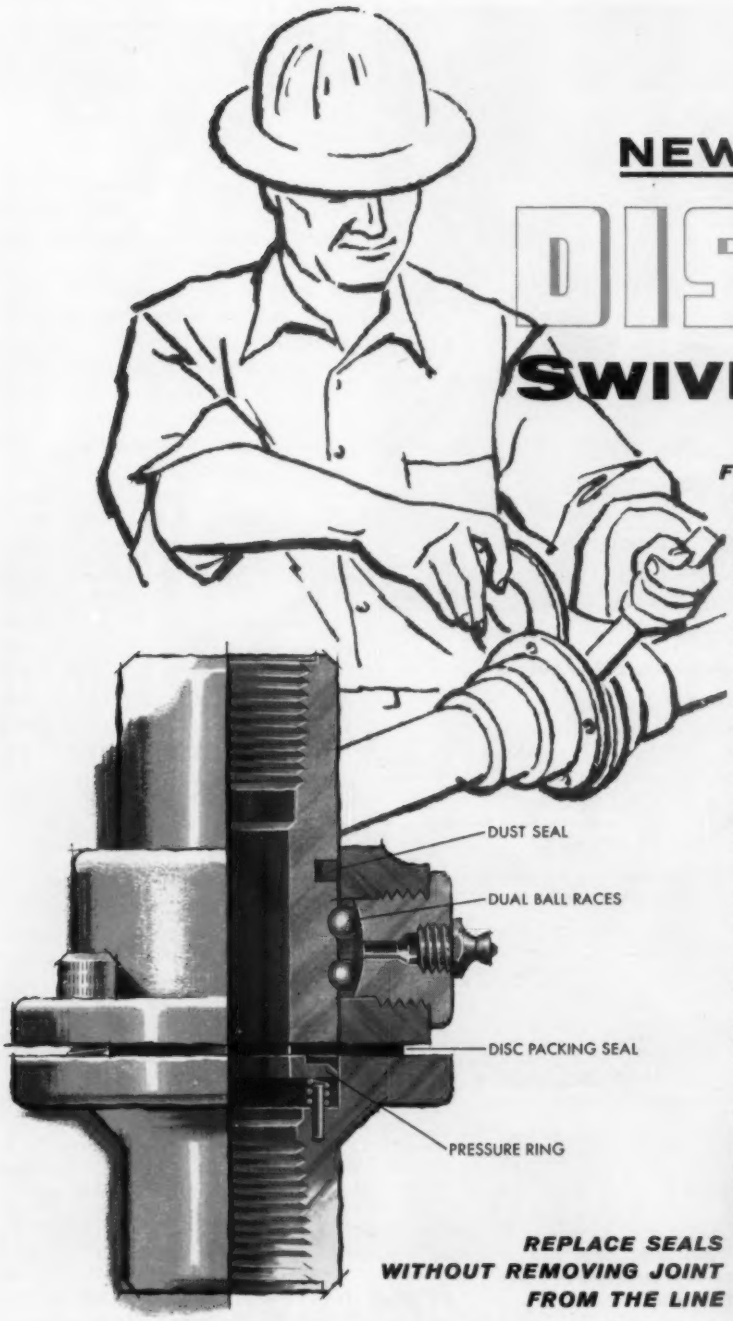
Economizer Tubes Cleaned With No Generator Downtime

THE EFFICIENCY with which a steam generator burns coal is affected by many factors. One of the most important is stack-gas temperature, which is largely dependent on the cleanliness of the heating surfaces of the steam generator.

As the flue gas side of the economizer tubes in the steam generator becomes dirty, the water inside absorbs less heat, causing stack gas temperature to rise.

Stack gas temperature can be kept

NEW CHIKSAN DISCPAK SWIVEL JOINTS

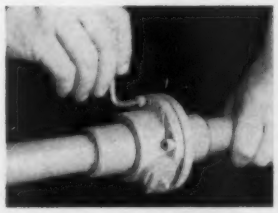


FOR STEAM AND HOT GAS SERVICE

Created specifically for service on lines employed in steam and hot gas service, the Chiksan Discpak embodies a new construction design which permits packing units to be replaced without removing the joint from the line. The outer housing of the Discpak is cut apart at the packing chamber and both ends are flanged at the cut. Four allen-type cap screw bolts are used to secure the flanges. A disc-seal, housed between the two members, provides a fluid-tight seal between rotating and stationary members of the Discpak Swivel Joint. A spring loaded pressure plate holds the packing in sealing position against the swiveling member.

The new Discpak has a maximum temperature rating of 600° F. and a maximum pressure rating of 300 psi. All turning movement in the Discpak takes place on a double row of precision ball bearings. Write today for literature and prices. If your plant or equipment lines utilize hot gas or steam, it will pay you to know about this new field-proven Discpak swivel joint.

REPLACE SEALS WITHOUT REMOVING JOINT FROM THE LINE



To replace the disc-seal, simply remove four allen screws and spread line slightly with a flat metal bar.

CHIKSAN

CHIKSAN COMPANY, 330 No. Pomona Avenue, Brea, California

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

Please rush me a copy of your new Discpak Bulletin

NAME_____

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Dept. 2210

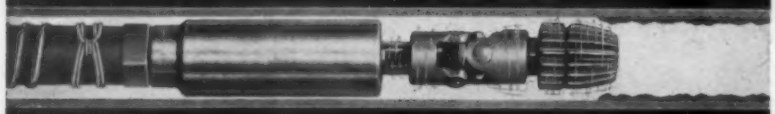
SEND FOR BULLETIN

New Discpak Bulletin 100 describes in detail the many features of this new swivel joint including full mechanical specifications.

57-26

For more facts circle 531 on Reply Card

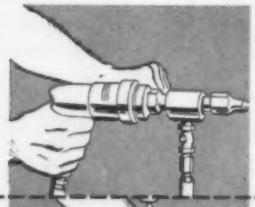
ELLIOTT
SMALL TUBE CLEANERS



types to do all jobs
quickly and effectively

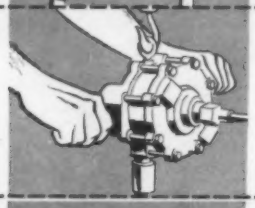
ELLIOTT 600 SERIES for small tubes—straight or curved

These air- or steam-driven motors are excellent for routing light scale in tubes with inside diameters from 5/8" to 1¾". Various types of cutter heads and brushes are available for specific tube cleaning requirements.



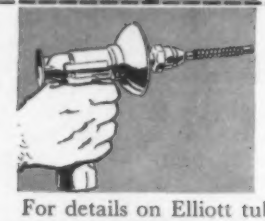
ELLIOTT 5100 SERIES lightweight cleaner for removing medium scale

Air-driven motor with trigger action for motor control, finger-action valve for water flow, built-in speed governor and oil reservoir. Two sizes.



ELLIOTT SUSPENSION SERIES for heavily scaled straight tubes

Air, steam, or electric motor drives shaft fitted with drill or brush head. Motor is suspended outside, shaft and head enter tube.



ELLIOTT JIFFY GUN for extra-fast cleaning of light accumulations

Simply insert nozzle into tube and push. Released air or water pressure shoots nylon brushes or rubber plugs through condenser or heat exchanger tubes. For tubes ½" to 1".

For details on Elliott tube cleaning and maintenance equipment, contact Elliott District Office or write Elliott Company, Lagonda Division, Springfield, Ohio.

Y7-1

ELLIOTT Company
Headquarters for Tube Cleaners and Expanders

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

down by periodic cleaning of the tubes, which can be done without shutting down the steam generator. The economizer tubes are washed by spraying large amounts of water over the top surface of the tubes while the boiler is banked. The water runs down over the tubes carrying the dirt away with it. The whole process takes four or five hours.

Stack gas temperatures are checked two or three times every week on our seven high pressure boilers. This permits evaluation of the economizer washing program and scheduling of washing which result in the greatest net savings.

The program has resulted in lowering average stack-gas temperature of the high pressure boilers 10 F and a savings in one year of $20,000. *From Coal To Kilowatts, published by Detroit Edison Company, Detroit, Mich.*

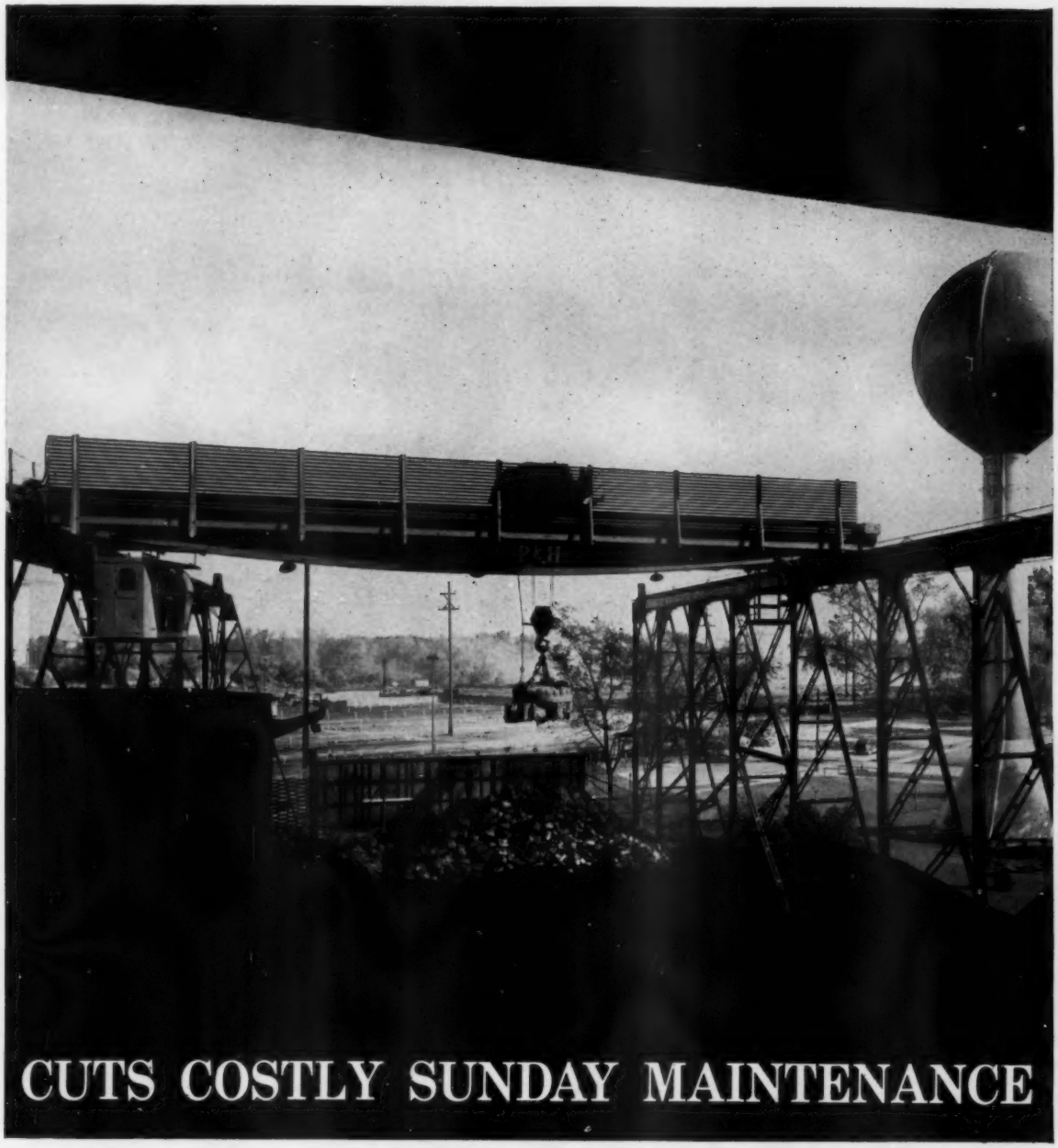
Sludge Disposal at Sewage Plant

INDUSTRIAL WASTE problems at the Linden-Rosell, N. J., sewage disposal plant, makes biological treatment of the waste impossible. Because of the proximity of the plant to the Atlantic Ocean, it was determined that barging to sea for dumping was more economical than incineration.

Sludge is collected in two covered storage tanks, 58 ft in diameter and 22 ft high and constructed of reinforced concrete. Each tank has capacity of 930,000 gal, or 4000 tons, of accumulated sludge, with facilities for stirring, recirculation and removal of free water settling out of the sludge.

A 24-in. cast iron force main parallels the plant effluent outlet and is laid on an ascending grade from the sludge pump house to the dock site to permit drainage back to the plant after pumping. The force main terminates in two gate valves to which are attached 20-ft lengths of 12-in. hose for barge loading.

Before sludge is transferred to the dock site it is homogenized by recirculation, using the same



CUTS COSTLY SUNDAY MAINTENANCE

Revolutionary P&H development... Electronic "stepless" crane control... eliminates 60% of wearing parts

Maintaining your cranes on Sunday to avoid production-line interruptions during the week is expensive, isn't it? P&H electronic crane control is the answer to that problem.

P&H electronic crane control is an outstanding new crane development, exclusive with Harnischfeger, and proved in over 300 installations. It's a simple wiring circuit that eliminates over 60% of the wearing parts found on previous crane controls — the wearing parts that need most frequent replacement.

Electronic control not only reduces maintenance, it furnishes "stepless" control response, making possible infinitely variable—more sensitive—crane operation. What's more, this major improvement can be applied to any existing AC crane.

Make sure your next overhead crane inquiry specifies this revolutionary crane development — P&H Electronic Control. Write Dept. 107C, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ...quality and service for 73 years

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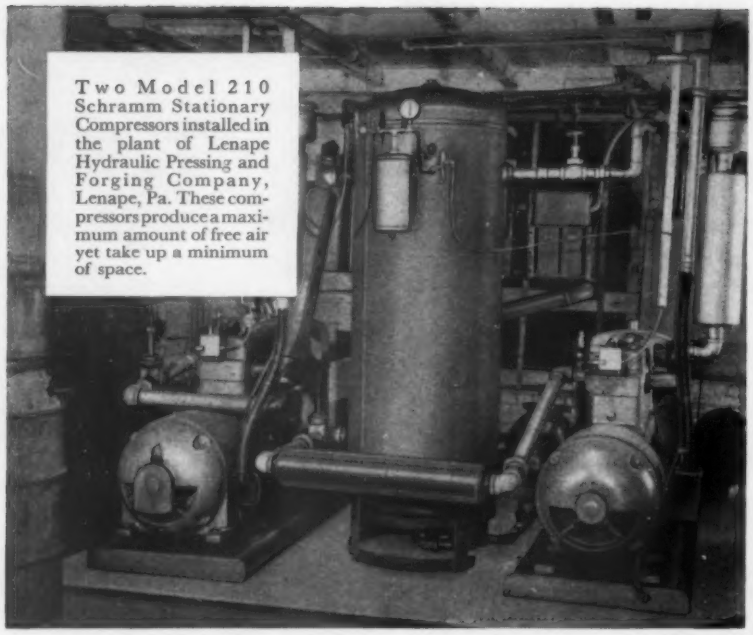
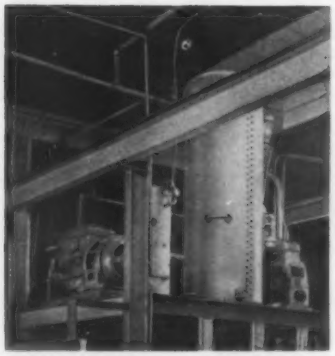


Two Model 210 Schramm Stationary Compressors installed in the plant of Lenape Hydraulic Pressing and Forging Company, Lenape, Pa. These compressors produce a maximum amount of free air yet take up a minimum of space.

FORGING COMPANY "SOLD ON" SCHRAMM...

"Keep finding new uses all the time"



Two Model 105 Schramm Direct Drive "Utility" Compressors were first installation at Lenape—have since been replaced by two Model 210's for added capacity. Absolute lack of vibration permitted installation on roof of small interior room.

Schramm forced lubrication reduces wear on all moving parts. Balanced reciprocating parts also reduce wear and maintenance. Units have 90% interchangeable parts between sizes.

Grinding, scaling, chipping, cleaning machines, blowing chips, operating furnace doors, air chucks and drill press clamping devices—Schramm Air Compressors power an amazing number of jobs for the Lenape Hydraulic Pressing & Forging Company of Lenape, Pa. So many jobs, in fact, that since 1937 the Company has consistently added to its battery of Schramm 105 and 210 Compressors. A Company spokesman tells us, "We keep finding new uses for Schramm Compressors all the time."

The fact is that Schramm Compressors *adapt* to more uses than most others. One reason is their ability to deliver their actual rated capacity of free air. Another is their space-saving feature; there is no more compact compressor made. Third, balanced reciprocating parts give vibrationless operation, permitting out-of-the-way installation without special foundation. Finally, Schramm Compressors can be driven by any source of rotative power and operate for long periods without maintenance.

From Schramm you can get a complete compressor "package"—everything necessary for an installation, from a single source with single responsibility. Full details of Schramm Industrial Compressors are yours without obligation. Simply write for Catalog 5510 or see your nearest Schramm dealer.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

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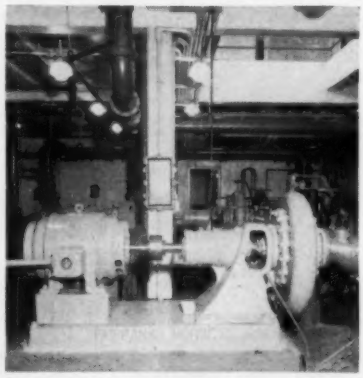
PLANT ENGINEERS' DIGEST

(Digest begins on page 40)



These pumps move 3500 tons of sludge to fill a 318-ft barge in five hours

pumps that handle loading. During the loading operation, samples are taken each time the level drops one foot and when the tanks are pumped down to the 7-ft level a stream of liquid effluent is introduced to break up collected sludge on the bottom of the tanks.

When pumping is completed, the force main is flushed with effluent for 15 minutes, the time required for fluids to reach the far end of the main, and the effluent is then allowed to flow back into the plant for recirculation.

The loading job is done at three week intervals and the two centrifugal pumps, operating alternately, move 3500 tons of sludge through the force main to fill the 318-ft barge in five hours.

The pumps chosen for the sludge handling job are two 8-in., horizontal centrifugals. Two 60 hp induction motors drive the pumps at an operating speed of 875 rpm. These two pumps have been in service since 1952, handling sludge with a solid content as high as 10 per cent. In spite of the difficult nature of the service, these units have never required repair of any kind.

For breaking up sludge, priming the sludge pumps and flushing the sludge force main, a 5-in. centrifugal pump is used. This pump is driven by a 10 hp, 1170 rpm induction motor mounted on the same sub-base. *From Fairbanks-Morse News, published by Fairbanks, Morse & Co., Chicago, Ill.*

more motor
than ever before

1 TO 50 H.P.

THE REVOLUTIONARY TYPE H

U. S. UNICLOSED

more motor dependability is the result of more and more exclusive features: Asbestos insulation against heat and moisture; Lubriflush bearing construction for longer life; Ventrifoil baffles to direct air, deflect moisture; rugged, normalized cast iron frame . . . all Uniclosed Type H features for longer motor life, more efficient power. Write for profusely illustrated multicolor bulletin today.

more LIFE

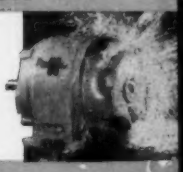
Lubriflush replaces old grease with new, for longer bearing life. Other life-lengthening features of Uniclosed are explained below.

more RUGGED

Cast-iron frame defies distortion. The smooth cast-iron surface is highly corrosion-resistant. Heavy solid feet are a substantial part of the frame.

more PROTECTION

Ventrifoil directs air, deflects water. Each end of motor has specially formed deflector that directs air around bearing housings, into fans on rotor.

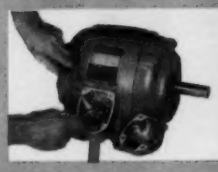


more INSULATION

U. S. multiple protection increases insulation life. ASBESTOS — for protection against heat. POLYESTER FILM—for greater physical strength.

more CONVENIENT

The spacious conduit box on Uniclosed Type H is heavy-duty cast-iron, diagonally split type, attractively contoured —easy of access.



MAIL COUPON NOW

U. S. ELECTRICAL MOTORS INC. PLE-10
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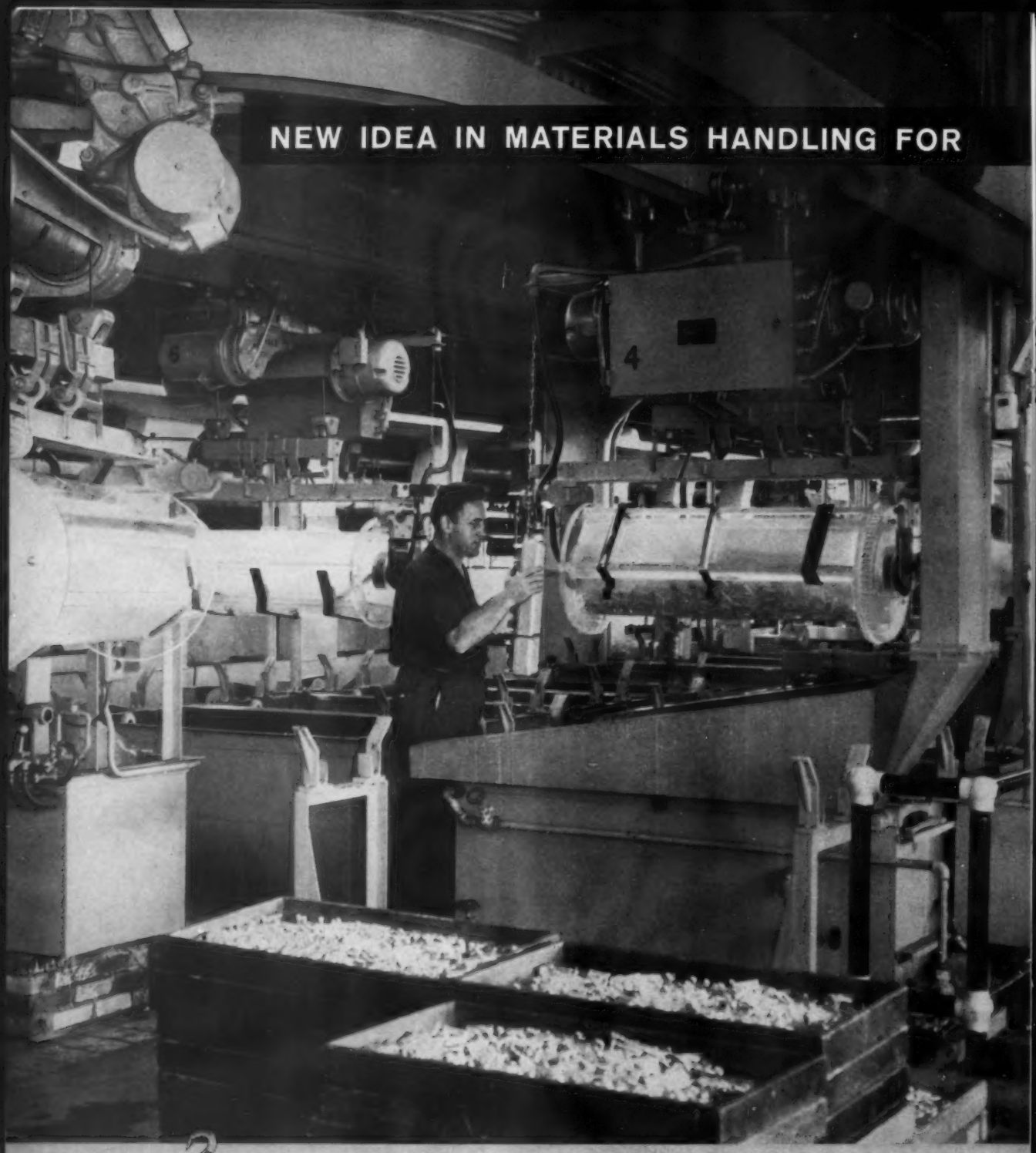
U.S. Electrical MOTORS

For more facts circle 535 on Reply Card

NEW IDEA IN MATERIALS HANDLING FOR



PROCESS BEGINS—The barrels are loaded manually—then the operator simply pushes the "automatic" button to dispatch hoists, handling barrels full of parts, through the processing cycle.

CHECK THESE OUTSTANDING ENGINEERING FEATURES OF EVERY YALE CABLE KING:

- **EXCLUSIVE AIRCOOLING**—Sirocco blower cools brakes, gearing and oil—thus eliminating overheating, excessive wear and need for "cool-off" time.
- **QUALITY CONSTRUCTION**—Precision ball and roller bearings for smooth action. Gears and pinions are heat-treated for wear resistance.
- **INSTANT POWER**—High-torque, heavy-duty, totally-enclosed motor for fast lifting.
- **TWO-BRAKE SAFETY**—Weston-type load brake with positive lubrication for controlled lowering and magnetic motor brake—either will hold the load.
- **POSITIVE LOAD CONTROL**—Push-button action for quick and easy load spotting. One hand is free to guide the load.
- **CAPACITIES:** ¼ to 15 tons. Hook, lug or trolley suspension.

THE GILLETTE SAFETY RAZOR CO.:

Continuous Flexible Processing with Yale Hoists

To speed nickel plating of small razor parts, Gillette and Yale engineers recently developed a unique handling system using six Yale Cable King Hoists. These hoists—running on a closed-loop track—carry plastic, perforated barrels of parts from tank to tank in an automatically controlled processing cycle.

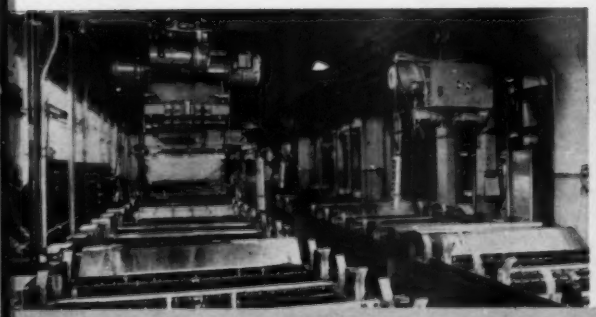
Entire process is "pre-timed." Cycle lengths for different parts can easily be changed and adjustments made for phases of the complete system at a central control panel. Result: Gillette gets greater output (as much as 10,000 parts every 5 minutes) *plus* processing FLEXIBILITY often missing in other types of handling systems.

Yale Cable King Electric Hoists the natural choice. Cable Kings are rugged, precision-engineered and stand up under *continuous* heavy-duty cycles. That's because Yale's exclusive aircooling system and load brake lubrication quickly dissipate brake heat...eliminate the need for "cool-off" time...keep Cable Kings running at top efficiency day-in, day-out. (For other features, see opposite page.)

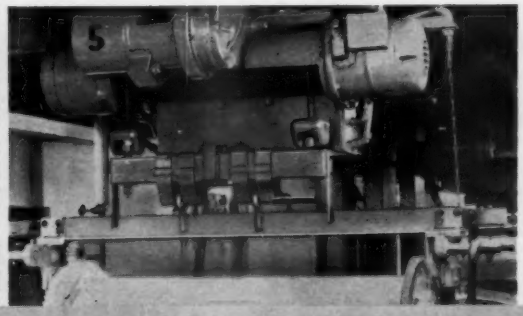
If materials in your plant, warehouse or shipping area must be moved at a fast and steady pace, why not find out how *one* Yale Cable King Hoist or a number of them in a coordinated handling *system* can step up production, eliminate wasted effort and increase the safety factor of your handling operations. Contact your Yale Hoist Distributor and discuss with him your particular handling problems. Or, write The Yale & Towne Mfg. Co., Philadelphia 15, Pa., Dept. A 4710.

To meet the need of expanding industries for better materials handling methods and equipment, look to Yale for advances in research, engineering, manufacturing, sales, service—as

YALE BUILDS FOR THE NEW ERA



SIMPLICITY—The whole system fits into a compact area. Hoist in left foreground is automatically cycling through the process prior to plating. Hoist on right is moving plated parts through final processing.



PRECISION CONTROL—Limit switches alongside overhead track control hoist travel. Gear in tank meshes with gear on barrel, determines rotation speed. Automatic controls "signal" hoists to proceed to next tank.

YALE* *REG. U. S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

YALE & TOWNE

GASOLINE, ELECTRIC & LP-GAS INDUSTRIAL LIFT TRUCKS • WORKSAVERS
WAREHOUSERS • HAND TRUCKS • HAND AND ELECTRIC HOISTS

YALE MATERIALS HANDLING DIVISION, A DIVISION OF THE YALE & TOWNE MANUFACTURING CO. MANUFACTURING PLANTS: PHILADELPHIA, PA.; SAN LEANDRO, CALIF.

For more facts circle 536 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by Vernon T. Kempf

Cut Water Use 700 Per Cent

FULL USE OF DEVICES which provide better control over rinse water purity and consumption can plug "production leaks" that literally wash dollars down the drain. Plating operations can be tightened to provide a greater profit, according to engineers at the Wagner Brothers plating equipment manufacturing division in Detroit. Profit losses on rinsing operations are unnecessary even with job-lot hand operated still tank plating equipment.

Most large high production plating equipment is designed and built for a specific type of plating work. Rinse consumption can be estimated with reasonable accuracy and proper control methods built right into the equipment.

On smaller, job-lot operations, conditions vary so much and so often that efficient rinse control measures are considerably more difficult. In spite of these difficulties, many control measures can be applied to reduce rinse losses.

One plant reduced rinse water consumption more than 700 per cent with a simple control measuring the relative contamination in the tank and automatically adding sufficient water to maintain the desired degree of rinse tank purity.

$10.00 Reward

WANTED .... Items of interest to plant engineers.

PLANT ENGINEERING will pay $10.00 minimum for each item accepted for publication. These items should describe a useful improvement or modification to plant equipment and buildings or more efficient use of any facilities. Where applicable, items should be accompanied by a sketch and/or a photograph. Send all entries to Editor, PLANT ENGINEERING, 308 East James Street, Barrington, Illinois

Other methods of reducing water consumption during plating operations are:

Proper racking and cycling so parts are adequately drained over the plating tank and do not carry too much plating solution into the rinse.

The use of reclaim tanks where space is available and production volume justifies. This lowers the water volume required for an efficient rinse.

Fog spray tanks are often preferred to reclaim tanks for after-plating rinse. This unit furnishes a constant non-contaminated rinse.

Straight spray rinse, in place of a dip rinse, is usually more effective on complicated parts and with plating solutions that do not rinse easily.

How Plastic Glazing Is Made

DESIGNED FOR HIGHEST QUALITY work, a $35,000, 60 ton press has been installed at the Portsmouth, Ohio plant of the Alsynite Company of America. Since the new press has a tolerance of .003 in., the company will produce flat panes of consistently uniform thickness.

Two men are required to operate the hydraulic press to produce sheets up to 56 in. wide and 96 in. long. Speed of the closure and the amount of applied pressure are automatically controlled.

A mat of glass fiber is impregnated with resins and placed in a mold to give the desired sheet thickness and finish. The mold is then transferred to the press where oil-heated platens provide uniform temperature and high pressure. Slow curing, which is desirable for best results, is done in the press. After removal from the press, each plastic sheet is cooled and then cut to size for shipment.

Precision Turbine Design Requires Good Lighting

Part of a program of modernization is this remodeled and air-conditioned drafting room at the DeLaval Steam Turbine Co. Acoustical baffles and translucent corrugated plastic sheet form the suspended ceiling. The lighting system, by the Sylvania Lighting Products Inc., produces 125 ft-c of shadowless glarefree light

No Traffic Jams at This Plant

TRUCK DRIVERS can be routed to proper docks without leaving their vehicles for instructions at the Rolled Steel Corporation, Skokie, Illinois.

On his arrival at the warehouse, the driver announces his presence by means of a telephone installed within easy reach of the truck cab. The truck dispatcher on the other end of the wire issues docking instructions to the driver. He may be told to drive to a designated dock or, if no docks are open, pull into the ad-

if it can be pushed through a pipe . . .

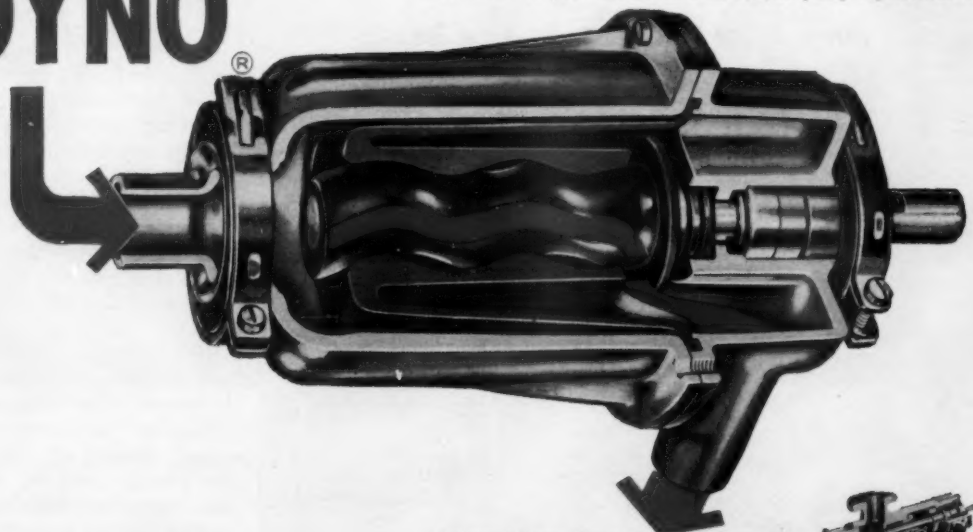
you can pump it with a

MOYNO®

No doubt, in your plant, certain materials are being moved by hand expensively that could be pumped economically by a Moyno. They pump anything that can be forced through a pipe . . . from very thin liquids to heavy, non-pourable abrasive substances . . . even materials containing suspended particles! As the illustration shows, progressing cavities, formed by the helical screw-like rotor turning inside the double-helical stator, move smoothly along, carrying the material with them . . . the cavities don't squeeze the substance . . . can't stick or gum up. Moyno pumps will not cause churning, foaming . . . won't aerate or vapor-lock!

Moynos are adaptable for a wide range of substances simply by modifying the materials the pumping elements are made of. They are available to pull up to 29″ of vacuum while discharging under pressure. If you have a pumping problem, chances are a Moyno will solve it!

Write today, for Bulletin 50 PE or look in the yellow pages for name of your nearest R & M Moyno pump representative.



Industrial type Moyno . . . available to 500 gpm, pressures to 1000 psi.

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For more facts circle 537 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

jacent parking lot. Here he will await further instructions to be announced over a loud speaker system.

Palletless Handling Cuts Costs

HANDLING OF MATERIALS without pallets has been perfected by the Industrial Engineering Department of Procter & Gamble, Cincinnati, Ohio, manufacturer of soaps, detergents, pharmaceuticals and chemicals.

Used by P & G's regional and district warehouses throughout the country, the system is applicable to handling of unit loads consisting of as many as 412 individual cartons of bottled or packaged products weighing up to 3000 lb. It has resulted in substantial decreases in warehouse costs and is expected to lead to more efficient shipping methods as well.

Standard lift truck with attachment for palletless handling speeds up shipping

Hydraulic clamps are mounted on the mast of a standard lift truck. Special arms for these clamps have a large contact area to prevent crushing the packaged products and are fitted with rubber faced surfaces to prevent load slippage. The clamp arms will adjust from 20 in. to 70 in. and are flexibly attached to their mountings to automatically adjust to the various load configurations.

The hydraulic system, controlled by a special valve on the truck, provides the required amount of clamping pressure for handling light, medium and heavy products.

Jig Centers Milling Cutter

Contributed by F. E. Riley

CUTTING A KEYWAY SLOT is a common operation on a milling machine. Here is a simple jig that will center the corners of the milling cutter over the work to an accuracy acceptable for a wide range of jobs.

The device is in the form of an attachment for a standard steel square and is composed of a flat steel plate with opposed notches cut accurately in the ends. The center line intersecting the notches must be parallel with the long edge of the plate which is in contact with the square blade.

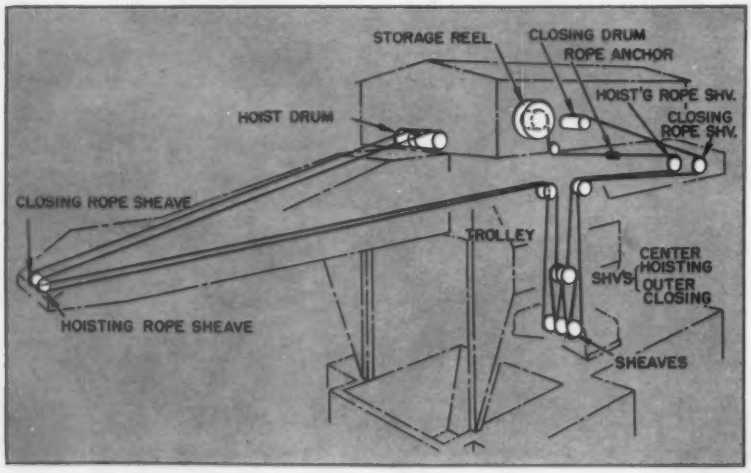
To hold the jig in position on the square, a clamp is made from a piece of steel fastened to one side of the plate. The back clamping plate lies in contact with the blade of the steel

(Continued on page 58)

Progressive Reeving Triples Rope Life on Unloading Towers

ROPE LIFE IS PROLONGED at least three times as long as existing systems due to a recently developed method of reeving wire rope used in bulk materials handling towers. Developed by engineers of the Mead-Morrison Division of McKiernan-Terry, Harrison, N. J., the new method uses one continuous length of rope for both hoisting and closing.

Maximum wear in any rope system occurs at points of contact with sheaves, rollers and drums. When rope wears at such points in older systems, the entire rope must be discarded. With the progressive rope reeving system, new rope from a storage reel is fed into the system in small increments and equivalent worn lengths removed. Wear is thus evenly spread throughout the entire rope length.

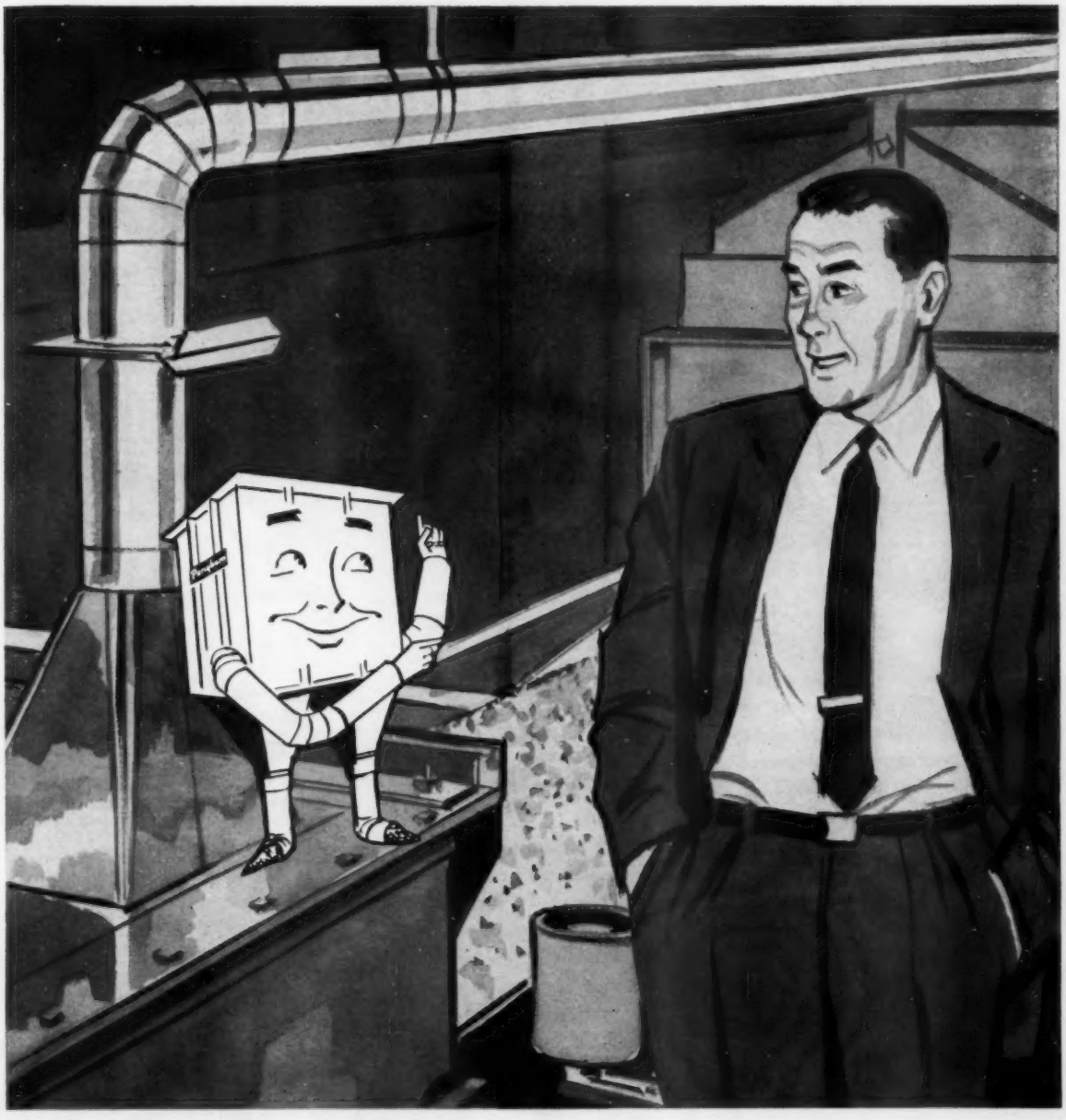


Releasing rope anchor permits wire rope to be moved through system. New wire is fed into system from storage reel and old wire is removed at closing drum

Actual field experience has shown that this new system gives a rope life of 214 tons of material handled per foot of rope in the system. Conventional systems, employing the identical wire rope, gave only 64 tons per foot of similar service.

Rope reeving for the new system is shown in the diagram. The only equipment variations from conventional systems are the addition of the storage reel for feeding rope into the system, and the redesign of the hoist drum to include a reeving sheave. The new system retains all the normal independent hoisting, closing and trolley motions of the grab bucket.

Feeding new rope into the system is very simple. Only two men are required for this operation. In addition, shutdown time is lessened, for one continuous length is used for both hoisting and closing. With older systems, hoisting and closing lines seldom wear out together.



"What? A 15% increase in production machinery life?"

Yes, Pangborn Dust Control can increase your machinery life up to 15% or more! Pangborn Dust Collectors trap dust controlled at the source to prevent the abrasive wear and tear of uncontrolled dust settling in valuable equipment. Pangborn Dust Control can save you thousands of dollars by substantially lengthening the life expectancy of your machinery.

What's more, Pangborn gives you other benefits of lower housekeeping costs, higher employee efficiency, extra profits from any salvage value and better employee and community relations. And Pangborn offers a complete line of collectors, dry and *wet*, for all jobs.

Why not discover how you can profit from Pangborn Dust Control? Write for Bulletin 922 to: PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control & Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 538 on Reiply Card

If you were plagued last winter by calls to "turn up the heat" in your plant, it's time to plan ahead for this year's icy temperatures. Super-Silvertop Steam Traps can increase the efficiency of your steam heating system, and save hundreds of dollars in fuel bills. Whatever type of steam system you have, unit heater, pipe coil, fan system, or any other, you'll find Super-Silvertops will vent the air and drain condensation rapidly, allowing the heater to reach full operating efficiency almost instantly.

Make your steam heating system give you your money's worth. Replace your obsolete traps with Super-Silvertops. Reduce corrosion, get faster heat, save on fuel bills, and enjoy a warm, comfortable plant the year 'round with Anderson Super-Silvertop Steam Traps. See your jobber or Anderson Sales agent today!

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SUPER-SILVERTOP STEAM TRAPS
the Engineered Steam Traps!

THE NEW WAY
Notice the simplicity and savings in fittings.

THE OLD WAY
Notice how bottom inlet requires complicated piping.

Free Trap Selector Booklet!
Tells how to select and install traps for all steam equipment. For your free copy, fill out and mail this coupon to:
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1939 West 96th Street, Cleveland 2, Ohio

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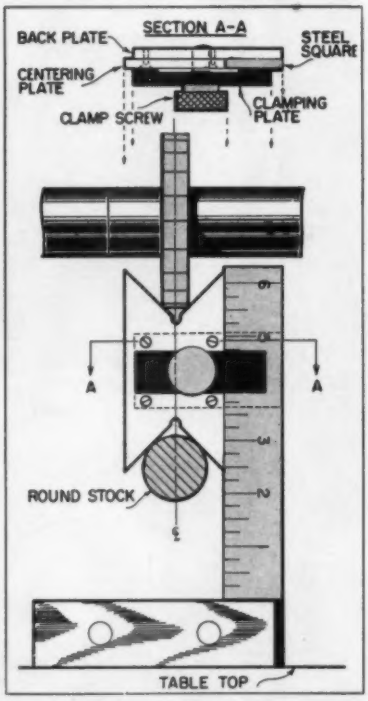
OPERATION—PRODUCTION

(O and P begins on page 54)



Jig mounts on square to simplify set-up for slotting keyway accurately in shaft

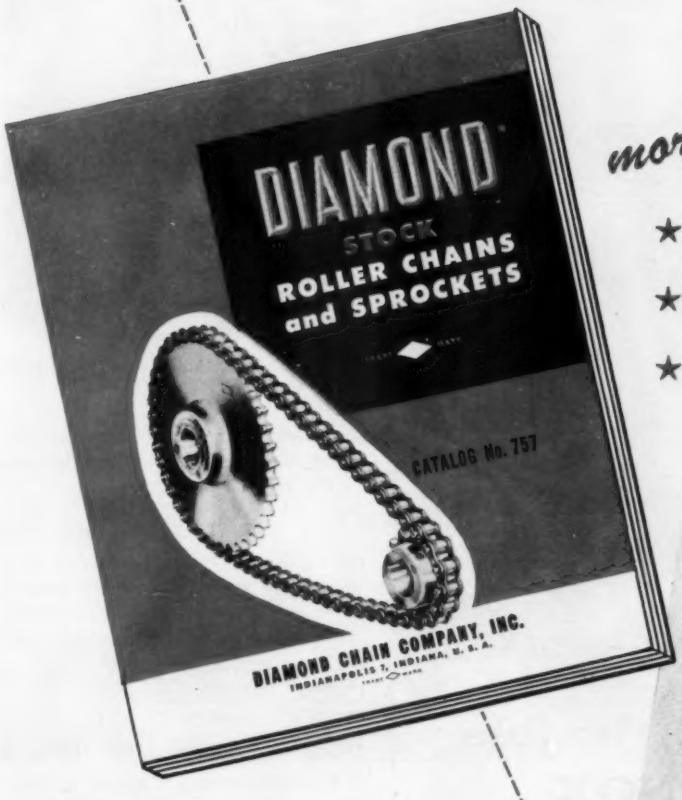
square. The shape of the front clamping plate and the manner in which the clamp screw fits into the tapped hole are shown in section A-A.

The jig is mounted on the square which stands on the machine table surface and the lower notch is brought into contact with the work surface. The square may be clamped lightly to the machine table. The cutter teeth are then brought into contact with the sides of the upper notch. Adjustments are made by operating the transverse and vertical table movements to align the cutter with the work.

Lock Protects Precision Parts

HANDLING LARGE FINISHED CUPS is simplified with a locking and separating device used by The Timken Roller Bearing Company, Canton, Ohio. Designed by K. R. Adair, Superintendent of Maintenance, the device makes it possible to stack one large cone on top of another without danger of their slipping. A sudden stop or quick turn without

THIS NEW DIAMOND CATALOG IS READY TO HELP YOU NOW



more helpful than ever!

★ MORE sprocket sizes

★ NEW taper bushed shaft couplings

★ MORE sprocket information

SOME TYPICAL HEADINGS

How to Select Roller Chain Drives

Speed Ratios for Sprocket Combinations

Horsepower Ratings

Lubrication Requirements

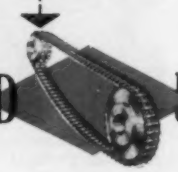
CATALOG 757

is packed with charts and tables to make correct selection easy!

Selecting stock Diamond Roller Chain and Sprockets from this big 68-page catalog saves you time and saves you money.

Catalog 757 lists additional sizes of roller chains and sprockets carried in stock by Diamond and Diamond Distributors. Your nearest Diamond Industrial Distributor is listed for your convenience. DIAMOND CHAIN COMPANY, Inc., Dept. 614, 402 Kentucky Ave., Indianapolis 7, Ind. *Offices & Distributors in All Principal Cities.*

THE TRADE MARK ◇ IS ON EVERY LINK

DIAMOND  **ROLLER CHAINS**

MAIL COUPON TODAY!

Diamond Chain Company, Inc.
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☐ **Please send me a copy of the new Diamond Catalog No. 757**

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Keep plant space flexible with BLAW-KNOX Electroforged® Steel Grating

If expanding production set-ups are cramping feeder and storage areas in your plant, it will pay you to check into Blaw-Knox Electroforged Steel Grating.

Storage platforms of Blaw-Knox steel grating put unused space to work easily, economically. There's nothing to wear, nothing to patch. Blaw-Knox Electroforged grating fits neatly around pipes, beams and machinery without any alterations to the building, and, at the same time, admits maximum light and ventilation to the entire area.

Blaw-Knox Electroforged Grating for walkways, stair treads and floors is fabricated to your specifications to meet your own operating conditions. Complete data on all types is contained in Bulletin 2527. Write for your copy today.

BLAW-KNOX COMPANY

BLAW-KNOX

Equipment Division
Dept. H, Pittsburgh 38, Pa.

For more facts circle 541 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 54)

Shop-made locking device protects precision parts during moves in the shop

the clamps in place could cause the heavy cones to slip off the skid due to the smooth surfaces of the front and back faces.

The space between the large pieces, created by the devices, makes it possible to quickly attach power crane hooks for lifting. Brass shoes on the locking device prevent nicking or scratching of the precision parts.

Portable Unit Tests Plate Welds

SMALL SURFACE CRACKS in finished welds on heavy plates are difficult to detect with X-rays. Supplementing radiography procedures, the Brooklyn Navy Yard uses a magnetic particle inspection technique.

A rubber squeeze bottle is used to spread a special metal powder on

Electric probes induce magnetic field into weld. Particle pattern shows cracks

Transitop is applied easily and quickly. It speeds the job.
Transitop panels are ideally suited for spandrel construction.
Transitop is widely used for interior walls.
Transitop adds extra square feet to the interior of the building.

8 to 12 feet tall—easy to install

Johns-Manville TRANSITOP® prefabricated panels meet the trend to curtain wall construction in modern buildings

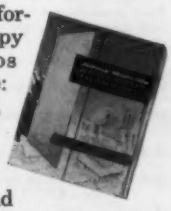
WHEN used as curtain walls, J-M Transitop insulated structural panels often pay their own costs for economy, speed of installation and permanence, in buildings of heavy or light construction.

For instance, a Transitop 1 9/16-inch-thick curtain wall has the equivalent insulation value of a 24-inch thick brick or masonry wall. Because these Transitop panels weigh only 4.7 lbs. per square foot, they reduce the dead load factor. They permit lighter wood or steel framing and make for less expensive foundations.

Comparative cost figures will show clearly that Transitop structural panels can cut dollars from total building costs. You'll note big savings in steel, lumber, labor and time.

Attractive in appearance yet amazingly durable, Transitop panels cannot rust or corrode. They require no painting or other preservative treatment.

J-M Transitop is a prefabricated panel of integrally impregnated insulating board, faced on both sides with noncombustible Asbestos Flexboard sheets. Available in panels 4′ wide by 8′, 9′, 10′ or 12′ long; and 11/16″, 1 1/8″, 1-9/16″ or 2″ thick.



For complete information send for a copy of "J-M Asbestos Transitop." Write: Johns-Manville, Box 111, New York 16, New York. In Canada, write: 565 Lakeshore Road East, Port Credit, Ontario.

JOHNS-MANVILLE PRODUCTS

Johns-Manville

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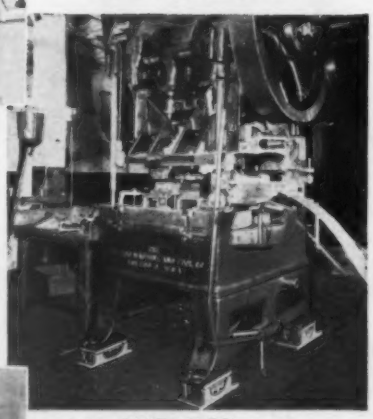
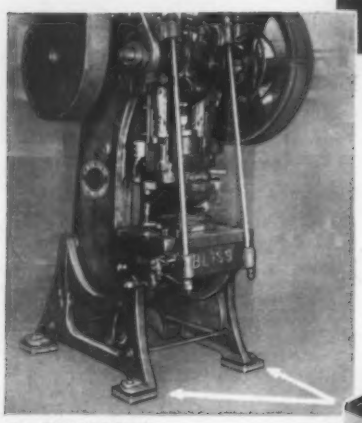
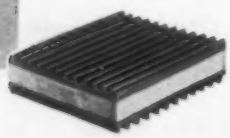
STOP VIBRATION with KORFUND VIBRATION CONTROL

A TOUGH PROBLEM solved by specially designed Korfund Steel Spring Vibro-Isolators. Shock from this 100,000#-600 ton capacity press was cracking building walls. Four specially designed 25,000# capacity Korfund Steel Spring Vibro-Isolators, themselves weighing 600# each, were installed under the press. Building damage stopped and heavy production schedules were maintained. Yet, the price of the special Korfund Isolators was less than 3% of the press cost.





AN AVERAGE PROBLEM—typical of those solved every day by Standard Korfund Steel Spring Vibro-Isolators. Vibration and noise from this double crank press, which could be felt and heard throughout the building, were stopped by Standard Korfund Steel Spring Vibro-Isolators. More and more manufacturers are discovering how Korfund Vibro-Isolators permit press installation without reinforcement of floors, permit press installation *anywhere* (even near precision equipment) for better plant layout, increase press speed and production, improve quality.



A SIMPLE PROBLEM solved inexpensively and *effectively* by Korfund Elasto-Rib Pads. In this case, Elasto-Rib Pads installed under each of the legs of this press stopped transmission of vibration and noise. For the less critical installation, Korfund Elasto-Rib Pads provide low-cost, *effective* vibration and noise control, and eliminate bolting to the floor.

PUNCH PRESSES are notorious for the amount of vibration and noise they transmit—yet in the three cases illustrated, Korfund Vibration Control units successfully solved the problem. In our files are scores of case histories describing equally satisfactory installations on many other types of machinery.

A selector chart is available giving recommendations for various vibration control problems. Write for your copy of Bulletin No. 13, or see our catalog in Sweet's Files.

For specific recommendations, contact us or the Korfund representative you'll find in most principal cities. A half-century of experience is at your disposal.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-35R Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

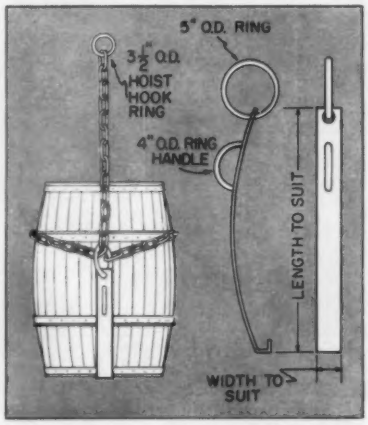
(O and P begins on page 54)

the weld. Probes induce a magnetic field into the weld and the particles show irregularities in this field when cracks are present. The prods are shifted 45 degrees and the test is repeated for transverse flaws.

The instrument weighs 45 lbs, is readily portable and takes power from a standard 115 v outlet. It was manufactured by the Phillips Electronics, Inc., Mount Vernon, N.Y.

Fast Keg Handling

Contributed by H. B. Fuller
The Carborundum Company



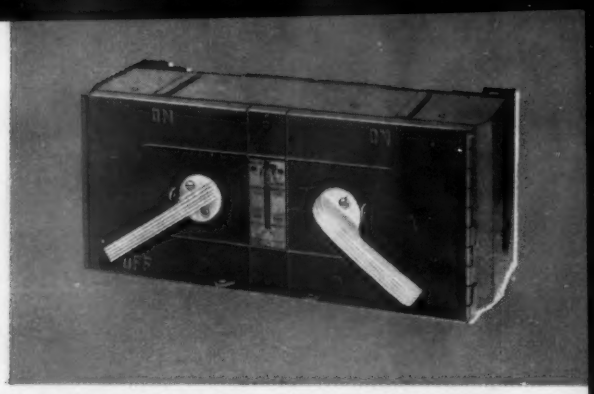
Hoisting kegs can be done quickly and safely with this hooked bar and chain slip noose. Bar is sized to the kegs being handled and is used to prevent the noose from slipping off top of the keg

Vibrators Save Coal Chutes

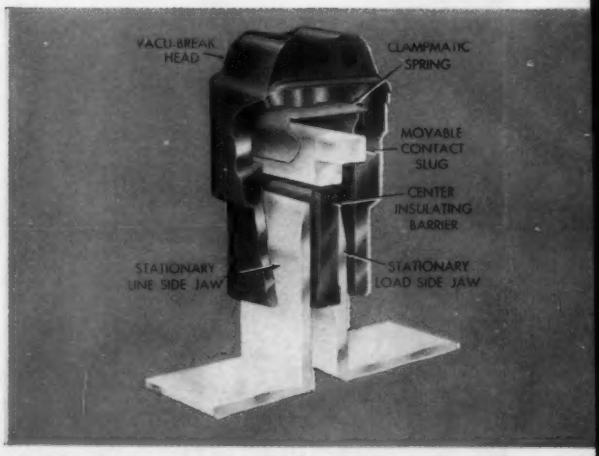
SCARS OF PAST POUNDINGS are still visible on this chute at the Cluett, Peabody Company plant in Waterford, N. Y., where the two Eriez vibrators, recently installed above and below the weighing gate, have put an end to this former method of loosening packed coal.

When the boilers call for fresh fuel, the units transmit their vibrating impulses for a period of 30 seconds, starting the crushed coal on its way. Arching, sticking or bridging is prevented, bringing a new efficiency to the whole operation.

Teaming an electro-magnet with an Alnico V permanent magnet, the units set up a rapidly oscillating directional thrust to the material being handled. The compact, easily in-



Standardized switch units are interchangeable, available in a wide range of ratings. If requirements change, you can substitute new units with only a screwdriver and wrench. Horsepower-rated switches have interlocked doors for added safety.



Vacu-Break chamber in switch units smothers arcs, reduces pitting and burning of contacts, keeps maintenance down. Quick-make, quick-break Clampmatic® action insures bolt-tight contacts, a more accelerated break, longer switch life.

Vacu-Break power panels minimize maintenance!

A cut in maintenance can bring a big cut in overhead. With a BullDog Vacu-Break® power panel you get such cost reduction—*plus* convenient, central control for lighting and motors in a single, compact device. Because the panels are factory assembled, you get more dependable performance, easier installation, too.

See your BullDog field engineer for complete information about these panels and other flexible electrical products by BullDog. He'll show you how a complete BullDog distribution system brings savings all down the line . . . creates an *integrated power network* that handles today's needs better, provides for future expansion as well.

© BEPCO

IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY

A DIVISION OF I-T-E CIRCUIT BREAKER COMPANY

BullDog Electric Products Company, Detroit 32, Michigan • A Division of I-T-E Circuit Breaker Company • *Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada), Limited, 80 Clayson Rd., Toronto 15, Ontario.

For more facts circle 544 on Reply Card

For more facts circle 545 on Reply Card

OPERATION— PRODUCTION

(O and P begins on page 54)

Vibrators (arrows) assure a steady supply of crushed coal to the boilers

stalled units need no rectifier and operate directly from available a-c current.

Hot Water Reduces Fuel Costs

HIGH TEMPERATURE WATER has reduced fuel costs more than 60 per cent at the Quality Metal Finishing Company, Lynwood, California. Previously, plating vats were heated by direct firing over an open gas flame. This method was costly and hazardous.

When ground was broken for a new and larger plant, a Parker hot water boiler with an output capacity of 2,800,000 Btu was installed. Water heated to a temperature of 290 F is circulated through a heat exchanger coil located in each tank. Individual tank temperatures are maintained thermostatically so that a variety of operations requiring different temperatures can be processed at the same time.

The boiler operation is almost completely automatic. The night watchman pushes a button at 5 a. m. and by 7:30 a. m. the plant is ready for operation. The packaged construction of the boiler helped to speed the installation and downtime and maintenance have been reduced to a minimum.

The firm specializes in chromate conversion coatings, paint base prime coating and in anodizing aluminum products in various colors.

B.F.Goodrich

New All-Purpose Pneumatic industrial tires cut your operating costs 4 ways!

THE first thing the driver of a materials handling truck notices when you change to B.F.Goodrich All-Purpose Pneumatic industrial tires is the smooth, comfortable ride—the sure, dependable traction! But *you'll* notice reduced operating costs because B.F.Goodrich All-Purpose tires:

1. **Lower machine maintenance by protecting equipment.**
2. **Cut plant maintenance by protecting floors.**
3. **Reduce breakage by cushioning loads.**
4. **Mean more work per salary-dollar by reducing driver fatigue.**

Specify **B.F.Goodrich tires when ordering new equipment**

The All-Purpose tread has hundreds of gripping edges that give positive traction in forward or reverse—on all hauling surfaces, indoors and outside. Husky shoulders and a continuous center rib wear slowly and evenly, give the All-Purpose greater stability under heavy loads.

FREE TW Analysis cuts costs up to 50%

The new B.F.Goodrich All-Purpose Pneumatic is just one in the only complete line of money-saving industrial tires for every materials handling job. Picking the right tire for your work is the job of the B.F.Goodrich Tire and Wheel Analysis man. His unbiased recommendations can save you up to 50% on tire costs, up to 20% on maintenance costs. This B.F.Goodrich service is *free*—just mail the coupon. A consulting service is available to manufacturers of materials handling equipment.

B.F.Goodrich
FIRST IN RUBBER

For more facts circle 546 on Reply Card

B. F. Goodrich Tire Company
A Division of The B. F. Goodrich Company
Department TW-657, Akron 18, Ohio

I would like further information on your FREE TW Analysis.

NAME_____

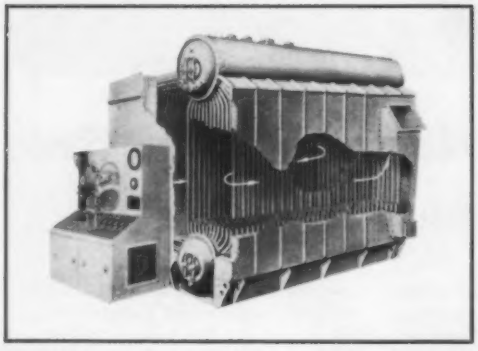
COMPANY_____

STREET_____

CITY_____ STATE_____ ZONE_____

Architect's rendering of the Lake Meadows project. Skidmore, Owings and Merrill, Architects.

Chicago's newest planned community is served by C-E Boilers



Cutaway view of typical VP Boiler. For capacities from 4,000 to 40,000 lb of steam per hr. Pressures to 500 psi. Oil or gas fuel.

Firing aisle of the Lake Meadows boiler room showing three of the five C-E Package Boilers, Type VP.

Located on a 100 acre site overlooking Lake Michigan, Chicago's newest planned community, the Lake Meadows project, offers gracious living within the confines of a large city. Owned and managed by the New York Life Insurance Company, Lake Meadows provides distinctively appointed apartments, spacious grounds, a modern shopping center, ample parking facilities, yet is within minutes of the heart of the city. When completed, this project will house 2000 families and will include an eight acre park. Construction has already begun on a new elementary school located on two acres adjacent to the housing development.

A project of this size requires considerable steam capacity to provide ample heat and hot water as well as to perform the many other services required. To do the job, the New York Life Insurance Company originally selected three C-E Package Boilers, Type VP. Later, as new housing units were added, two additional VP Boilers were installed. Their outstanding performance and efficient, trouble-free operation is evidenced by the repeat order placed with Combustion for the final two units.

Complete information on C-E Package Boilers is available in Catalog VP-3. Write for your copy.

COMBUSTION ENGINEERING

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

Canada: Combustion Engineering-Superheater Ltd.

B-986A

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS, PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

For more facts circle 547 on Reply Card

HAS 90° MOUNTING RANGE!

Even on its side, the GL-6011/710 gives dependable, full-life performance. Closely controlled mercury content makes this possible. A special capsule, flashed inside the tube after exhausting, provides exactly the right amount of mercury. No troublesome excess is left over to collect on the tube elements, when tube is tilted, and cause internal arc-overs.

GENERAL ELECTRIC GL-6011/710 THYRATRON

NOW...install GL-6011/710 thyratrons in any position upright to horizontal! Standard G-E warranty applies!

THE sockets in your welding-control panels may call for mounting the tubes horizontally. Certain equipments employ this method for increased compactness.

You can still have the benefits of G-E thyratron dependability. Type GL-6011/710 operates equally well and gives equally long life, whether installed upright or on its side. The full written tube warranty applies in both cases.

Closely controlled mercury content, responsible for this versatile tube performance, is only one of many features that spell thrift when you replace with the GL-6011/710 and other General Electric thyratrons for welding and motor control.

A new, superior epoxy-resin compound for bases and anode caps promotes tube reliability. General Electric's unique method of cathode processing greatly lengthens thyratron life. These and other G-E plusses mean less equipment downtime . . . fewer tube replacements . . . and the cost reductions you achieve from both.

Check, below, the list of thyratrons which the GL-6011/710 will replace. Then phone your local G-E tube distributor! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

TYPE GL-6011/710 WILL REPLACE:

MERCURY AND GAS-FILLED TYPES	GAS-FILLED TYPES	
	For certain special applications, particularly those involving ambient temperatures above 140 F, check detailed ratings before replacing with Type GL-6011/710.	
WL-6011/710	C3J/5632	5632
NL-710	EL-C3J	WT-210-0043
NL-710/6011	GL-5632/C3J	WT-210-0106

Progress Is Our Most Important Product

GENERAL ELECTRIC

161-1D4

For more facts circle 548 on Reply Card

For more facts circle 549 on Reply Card→

A great gear-motor

NEW integral unit

Compact, one-piece unit has complete, easily removable motor, machined-in alignment.

NEW all-motor unit

Providing wide application flexibility, motor change may be accomplished without disturbing gear.

General Electric's NEW gear-motor line

Now, you can meet all your low-speed drive requirements from a brand new line of General Electric packaged power transmissions. This 3-unit line is based on a new, completely simplified, helical design that has evolved from General Electric's 25 years of gear-motor engineering and application experience. And it's a line that can provide you with important, 3-way savings on all low-speed applications.

1. Greater reliability: This new line incorporates the most advanced gear manufacturing methods and all units are factory tested before shipment. In addition, you benefit because you purchase both motors and gears from a single manufacturer.

2. Easier Maintenance: A cinch to assemble and disassemble, alignment is machined right into each unit. Gear components may be carried in stock as sub-assemblies, minimizing downtime for normal repair.

3. Reduced inventory: You can reduce your inventory with no sacrifice to your operating continuity. Parts standardization and interchangeability permit a basically lower inventory investment.

This new line was developed to keep pace with the new requirements and wider applications of gear-motors brought about by advanced manufacturing techniques. *Get complete information from your nearest Apparatus Sales Office or Distributor—or write for bulletin GEA-6704, containing line highlights, to General Electric Co., section 851-6, Schenectady, N. Y.* Gear-Motor and Transmission Components Dept.

NEW separate reducer

Unit can provide a variety of output speeds with change of belt or chain rates.

Progress Is Our Most Important Product

GENERAL ELECTRIC

General Electric says:

"On the average, only 1 out of every 1,000 G-E Fluorescent Lamps may not light."

C. C. Lawrence, operating manager, says:

"We installed 61,970 G-E Lamps and only 1 out of every 1,500 wouldn't light! That's 99.93% perfect!"

Owners: Galbreath Corporation—John W. Galbreath, Peter B. Ruffin

MR. LAWRENCE is the Operating Manager of the Socony Mobil Building—one of New York's newest and most dramatic skyscrapers—where nearly 62,000 G-E Fluorescent Lamps far exceeded the claims General Electric makes for them.

BUY General Electric Lamps and expect the same *performance that exceeds the promise!* General Electric manufactures its lamps with such care and precision that, on the average, 999 out of 1,000 G-E Lamps are free of physical defects which could affect their performance in service. And this performance doesn't stop here. *Evidence: Only 373 of the 61,970 G-E Lamps needed replacing during the first full year of service. That's only 6 out of 1,000!* General Electric Co., Large Lamp Dept. PE-107, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 550 on Reply Card

A new line of Standard Oil greases

RYKON

GREASE

Major breakthrough in grease technology results in development of new thickening agent. New grease has greater high temperature stability, superior multi-purpose qualities, improved lubricating properties.

Standard Oil instituted a grease research and development project several years ago. The result of this work is the line of RYKON Greases, which contain a unique new non-soap, organic thickening agent.

RYKON Greases surpass in stability and performance the best greases made up to this time. They bring to industry new opportunities for improved machine performance. They greatly reduce the maintenance and grease handling problems encountered in industry.

RYKON Grease properties

RYKON Greases are smooth, buttery-textured greases, made from the finest quality, solvent-extracted oil. Their thickening agent is a Standard Oil exclusive. RYKON Greases have these high-quality characteristics:

High temperature stability—Better heat stability than any other petroleum oil grease. ASTM dropping point of 480°F. Maintain consistency in service at high temperatures.

Mechanically stable—Maintain consistency even under severe mechanical working in service.

Chemically stable—Inhibit oxidation. Oil and thickening agent in combination possess extremely good chemical stability.

Wide temperature range—Lubricate at high and low temperatures. Extended range of application thus obtained makes RYKON Greases truly multi-purpose.

Water resistance—Do not lose consistency in presence of water. Highly resistant to water washout.

Oil separation—Minimum bleeding of oil in service and storage.

Anti-rusting—Exceptional natural rust preventive characteristics.

With RYKON Greases, lubrication can become simple, foolproof and less expensive—much less expensive, perhaps, than a single shut down caused by equipment failure due to the use of the wrong type of grease or the use of an "economy" grease lubricant.

RYKON Greases come in four Regular and three Heavy-Duty grades. Thus there is a RYKON Grease to take care of every grease lubrication job. Using RYKON Greases plant-wide can reduce your grease storage requirements, simplify lubrication maintenance training, cut down record keeping, save on dispensing equipment and reduce investment in grease inventories.

Get more facts about RYKON Greases. Call your nearby Standard Oil industrial lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

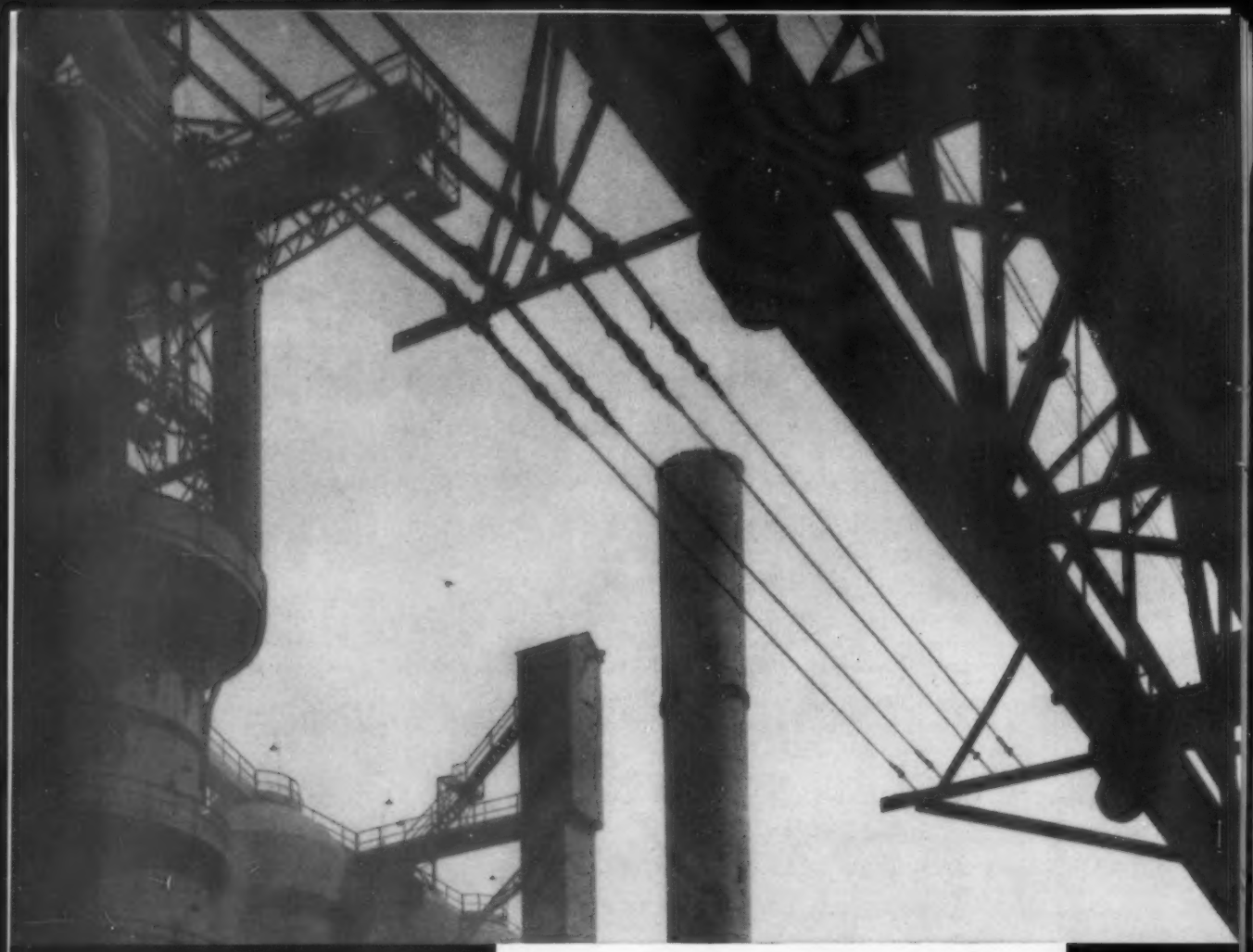
Check Chart Of RYKON Greases

Regular Line	Grade Consistency
RYKON Grease No. 0	0
RYKON Grease No. 1	1
RYKON Grease No. 2	2
RYKON Grease No. 3	3
Heavy Duty Line	
RYKON Grease No. 0 E. P.	0
RYKON Grease No. 1 E. P.	1
RYKON Grease No. 2 E. P.	2

STANDARD

STANDARD OIL COMPANY (Indiana)

For more facts circle 551 on Reply Card



for every temperature range—
for every operating condition

Carey®

SERVICE-PROVED INSULATIONS

Service Report on Carey Insulations at:

UNITED STATES STEEL CORPORATION

Gary Steel Works
Gary, Indiana

Gary Steel Works is the world's largest producer of raw steel, with an annual steel ingot capacity of 7,187,000 net tons. Its furnaces and mills cover an area of 2,700 acres, including 250 miles of railroad track and 65 miles of roadway. The plant employs approximately 21,000 workers, but its daily power and fuel requirements (2.8 million kilowatts) would amply serve a city of 300,000. Plant facilities include 1,162 coke ovens, 12 blast furnaces and 53 open hearths.

Carey insulations do double duty at world's largest steel mill

In early 1956, the nation's steel companies set for themselves a tough objective—to increase steel capacity by 5 million tons per year through 1958. To help meet this objective U.S. Steel's Gary Works is now in the midst of a multi-million dollar expansion program.

Carey Alltemp and 85% Magnesia insulations have roles in this program. They're helping boost production not only of steel, but of Gary Works' important coke and coal chemical by-products as well. Here's how these tough, dependable Carey insulations are doing *double duty:*

1 at the coke & coal chemical plant...

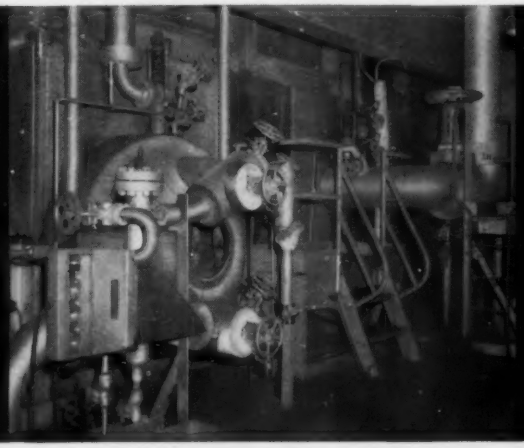
Steelmaking begins here, where coal is made into coke for use in the blast furnaces. Nylons and aspirin tablets are but two of the thousands of chemical by-products resulting from this coke-producing operation. Shown is a small portion of one of the six new boilers which will supply the steam for processing these by-products. They'll do the job formerly done by 18 boilers—a 300% boost in efficiency.

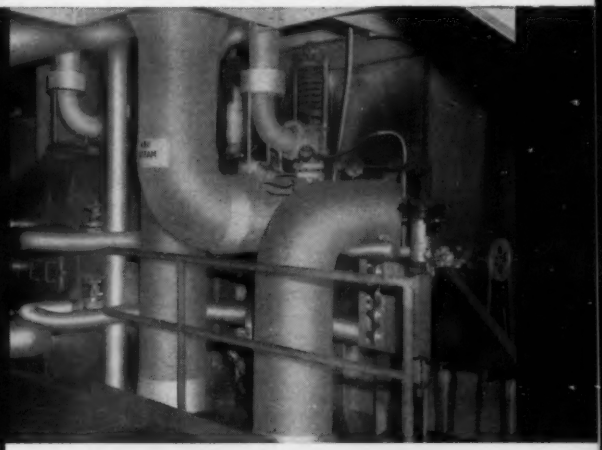
Insulation on two of the boilers is a combination covering of Carey Alltemp and 85% Magnesia. Operation pressure is 900 psi at 825°F. Boiler capacity 100,000 pounds per hour.

2 at the turbo-blower station...

12 blast furnaces produce the molten iron from which steel is made at Gary Works. The ingredients in this process are iron ore, coke and limestone—plus pre-heated air which is blown through the furnace by turbo-blowers.

Supplying steam to the blowers is the job of several giant, 4-story boilers. Pictured above is the steam header over one of the boilers, insulated with Carey Alltemp and 85% Magnesia. Boiler capacity is 250,000 pounds per hour. Operating temperature 850°—steam pressure 650 psi.





The physical characteristics of Carey insulation products are measured and tested with scientific precision by Mellon Institute of Industrial Research, Pittsburgh, Pa. This is your assurance of the accuracy of Carey product specifications. Mail coupon for literature and sample specifications, or for a call from your Carey Insulation Sales Representative.

Better Products for Industry Since 1873

THE PHILIP CAREY MFG. COMPANY

Lockland, Cincinnati 15, Ohio

Insulation Division: Plymouth Meeting, Pa.

For more facts circle 552 on Reply Card

THE PHILIP CAREY MFG. COMPANY, Dept. PE-107
Insulation Division, Plymouth Meeting, Pa.

Please send literature and sample specifications on

☐ Alltemp ☐ 85% Magnesia

☐ Please have your Insulation Sales Representative call.

NAME_____ TITLE_____

ADDRESS_____

FIRM NAME_____

CITY_____ COUNTY_____ ZONE_____ STATE_____

FLAMMABLES ENGINEERING

FLAMMABLES CONTROL METHODS AND PRACTICES IN PRODUCTION,

Depress for solvent . . . Release for safety!

Cost reductions ahead in production line applications of volatile solvents

Ambidexterity! . . . now production line operators are applying solvents and liquid adhesives with one hand and moving production parts on the way with the other.

Production line applications of volatile liquids frequently include laminating and cleaning . . . an instrument manufacturer uses an acetone binder in the assembly of plastic parts . . . an appliance manufacturer removes excess adhesive used in attaching fiberglas insulation to refrigerators. Result—production output increased, hazardous flammable vapors reduced to prevent flash fires.

Even the operator feels good—no more discomfort or costly time off the job due to noxious vapors . . . happier, too . . . with better piece rate bonuses.

For Further Information
Check Plunger Can File No. 50 On Coupon

Use empty drums for fire-safe waste disposal

Wait! . . . don't throw away your used drums. Use them for receiving oily waste cloths, solvent soaked rags, excelsior, trash. Special inexpensive metal covers can be easily attached. Result—fire-safe waste containers . . . large enough for all uses . . . keep plant orderly . . . prevent spontaneous combustion fires.

For Further Information
Check Drum Cover File No. 51 On Coupon

Progressive parts inspection at the work station

Self-service for the precision instrument maker! . . . machine operator cleans finished parts of fine

honing dust . . . inspects and checks required dimensional tolerances as he produces . . . no time lost . . . production speeded. Result—much desired cost savings. Protection against fire and explosion from cleaning solvent vapors? . . . YES! . . . in the event solvent vapors ignite, operator simply removes foot from treadle bar of parts cleaning tank to close cover instantly . . . stops fires fast.

For Further Information
Check Foot Treadle Dip Tank File No. 52 On Coupon

BY PROTECTOSEAL

PROCESSING AND IN MAINTENANCE

Published by
THE PROTECTOSEAL COMPANY
CHICAGO 8, ILLINOIS
WEST COAST WAREHOUSE: LOS ANGELES, CALIFORNIA
EAST COAST WAREHOUSE: CAMDEN, NEW JERSEY
IN CANADA: SAFETY SUPPLY CO., TORONTO

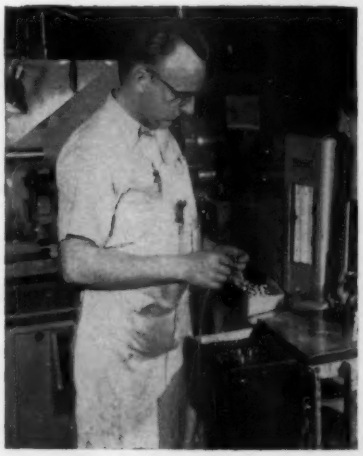
"Silent" helpers speed work of machine parts operator

Cleans while he works! . . . a "Silent" helper automatically washes cutting oil and chips from machined parts in solvent while operator continues work at his machine. Critical dimensions of *cleaned parts* checked right-at-the job! Safe, too . . . because solvent vapors are protected against fire and explosion.

For Further Information
Check Air-Matic Parts Washer File No. 53 On Coupon

Self-Inspection! . . . all the inspection equipment required to accurately "mike" small precision machine parts now located at the machine. Operator removes cutting oil and chips in work-high solvent container . . . "mikes" parts for accurate dimensional check without leaving station . . . no other inspection necessary. Safe too.

For Further Information
Check Machine Bench Can File No. 54 On Coupon



Cuts flammables handling costs at-the-job

Gone! . . . that old "bug-a-boo" . . . too much flammable solvent scattered throughout the plant. Now,

store up to 50 gallons of flammables at-the-job in approved containers of 5-gallons, or less . . . cut out excessive, time-consuming trips to distant flammables storage vaults . . . stop production delays . . . and at the same time reduce fire hazard of carelessly located cans of volatile liquids. Approved by Fire Chiefs of many cities.

For Further Information—Check
Flammable Storage Cabinet File No. 55 On Coupon

AT YOUR SERVICE / *specialized experience in*
FLAMMABLES ENGINEERING

Practical help in controlling flammable liquids used in production, processing and maintenance is readily available from Protectoseal Field Engineering Service without cost or obligation. Experienced field engineers who work constantly with flammable liquid uses and applications in many different industries have acquired a wealth of first-hand knowledge and experience which enable them to suggest practical ideas and adaptations for safe cost savings in storage, handling and use.

Jerry McCarty
serving Eastern Pennsylvania, Jersey and Delaware area.

FLAMMABLES ENGINEERING DATA

also available on any of the following flammables hazards

Check the file number on coupon.

File No. 56—Leaky Drum Faucets
File No. 57—Disposal of Oil Soaked Cloths
File No. 58—Dispensing Solvents within the Plant
File No. 59—Clogged Paint Spray Guns
File No. 60—Dispensing Rubber Cement
File No. 61—Applying Flammable Adhesives
File No. 62—Protecting Paint Brushes
File No. 63—Degreasing Small, Delicate Parts

The Protectoseal Company
1942 So. Western Avenue, Chicago 8, Illinois

☐ Please register my name for regular issues of Flammables Engineering Bulletins

☐ Send additional data on FILE NO's. 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63

Name_____ Position_____

Company_____

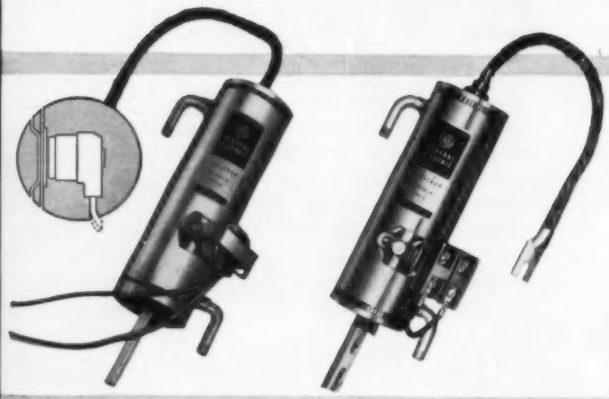
Address_____

City_____ Zone____ State_____

For more facts circle 553 on Reply Card

CUT WELDING COSTS WITH

Up-to-the-minute designs



G-E Convertible Ignitron has built-in thermal-contact bracket (circle) that will carry a thermostat for over-temperature protection, or for water regulation. Thermostat which is shown here is equipped with flying leads.

Convertible Ignitron above has a terminal-block thermostat. Bracket mounting of thermostat permits the same ignitron to be used in standard or temperature - controlled applications. You save stocking two tubes.

More hours of dependable service per dollar!

Here's why!

STABILIZED STAINLESS-STEEL JACKETS

General Electric uses *stabilized* steel for both inner and outer ignitron water-jackets. Characteristics of this material—its expansion and contraction, strength, chemical content—do not change with time or use. G-E ignitrons retain their full structural strength for life, adding to dependability and cutting tube replacements.

HIGHEST-QUALITY IGNITORS

General Electric ignitors—specially made and tested—will outlast others by as high as 2 to 1. Examples of 4-years-and-over G-E ignitor life are common; also cases in which G-E ignitors have outlived the tube. Carefully controlled materials; holding the ignitor resistance to close limits; precision grinding—these are reasons-why.

CONTROLLED-GRAPHITE ANODES

By using a specially-developed electronic grade of graphite, with both density and size of particles controlled to tight limits, General Electric is able to build ignitron anodes that stand up under extremely long and hard usage. The anode graphite is further treated at the General Electric factory for maximum life in heavy-duty service and under high-temperature conditions.

TRIPLE-DISTILLED-MERCURY POOLS

Mercury in G-E ignitron cathode pools is distilled to a point where impurity content is only 1 in 100,000 or less. Organic impurities, which can bring about gas formation, and inorganic materials, which can cause the ignitor to plate over, both are held to a virtually irreducible minimum. Increases tube dependability.

FACTORY-TESTED AT FULL RATINGS

Exclusive with General Electric is the special factory test equipment that operates G-E ignitrons at full ratings under actual welding conditions. You buy tubes proved-in-advance for service in your plant. Every General Electric ignitron, moreover, is checked at the factory for the possibility of vacuum or water-jacket leakage.

CONVENIENT SLIP-ON TERMINALS

No more need to remove the terminal bolts completely when installing or replacing General Electric welding ignitrons! Merely loosen the nut and slip off one terminal with its slotted design, slip on the new terminal—then re-tighten. It's as easy and fast as that, and you run no risk of misplacing the nut-and-bolt assembly. This up-to-date feature saves you time and trouble.

G-E LONG-LIFE IGNITRONS!

meet every replacement need.

General Electric Plastic-coated Convertible Ignitron has a plastic covering to shield workers from hazardous voltages. Plastic is red for warning. "Danger . . . voltage" is stamped on outside of each tube conspicuously.

G-E Temperature-controlled Ignitron is the finest tube of its kind. Over-temperature control . . . water regulation . . . both are built in. The tube is pre-adjusted at the factory for lifelong efficiency of operation when installed.

Shows you how to squeeze maximum value out of every ignitron dollar! This complete guide to ignitron care and maintenance is a "must" for your shop files. Solves dozens of ignitron operating problems; answers scores of questions. Get your *free* copy from your local G-E tube distributor!

You cut welding costs with G-E ignitrons because (1) their life-span is greater, giving you more service hours per dollar, and (2) G-E ignitrons are more dependable, requiring minimum tube replacement. Welder downtime is reduced.

Quality of General Electric ignitrons sets the pace for the industry. Study the advantages of these tubes at left. Every design plus can be entered on the credit side of your plant ledger—means a saving in upkeep, in inventory of replacement tubes to be carried on hand, in non-productive welding time.

Check, too, the wide range of G-E ignitrons manufactured and available to you! Convertible types . . . . . G-E temperature-controlled ignitrons . . . . . plastic-coated tubes for extra safety. All can be obtained in 40-, 140-, and 355-amp capacities. Every welder need is met. You can have G-E top ignitron quality right through your plant, with the greater economy—immediate and long-term—this brings.

And your tube source is conveniently close at hand. Your General Electric tube distributor—right in your area—stocks G-E ignitrons, knows ignitrons, knows your plant requirements, makes fast deliveries to your door. Phone him today! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Ky.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

161-105

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117 MODINES to fit any heating job

Portion of typical Modine distributor's stock. Write for names of stocking wholesalers nearest you.

any type, any size, any style

It's easier to meet exact heating requirements when you're selecting unit heaters from the complete Modine line. No matter what the mounting height, temperature or heat-throw demands—Modine has the answer. And buyers are assured of highest quality *because Modine designs and manufactures its own unit heaters.*

● Modine steam and hot water units provide perfect heating comfort at lowest possible fuel costs because the discharge temperatures are correctly related to heat throw and air volume.

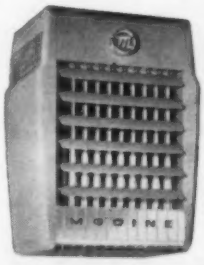
● Modine's gas-fired unit heaters last longer, cost less to install. Direct firing of tubes and reduction of heat exchanger mass give you heat within seconds.

For all the facts, see the Modine representative listed in your classified telephone directory. Or you can write directly to Modine Mfg. Co., 1563 DeKoven Avenue, Racine, Wisconsin.

102 STEAM OR HOT WATER UNIT HEATERS

Choose from 38 horizontal, 44 vertical and 20 power throw models. Of these, 38 are high corrosion resistant (HCR) models, 48 are low outlet temperature models. Write for a copy of Bulletin 157.

U-1361



15 GAS-FIRED UNIT HEATERS

All Modine gas-fired units have stainless steel burners. Eight models also feature *stainless steel* heat exchangers. The other 7 are equipped with *aluminized steel* heat exchangers. For more information on these outstanding units write for Bulletin 657.

AIRditioners | Convectors | Cabinet units | Gas unit heaters | Steam & hot water unit heaters | Duct furnaces

In Canada: Sarco, Ltd., Toronto

Modine
MANUFACTURING COMPANY

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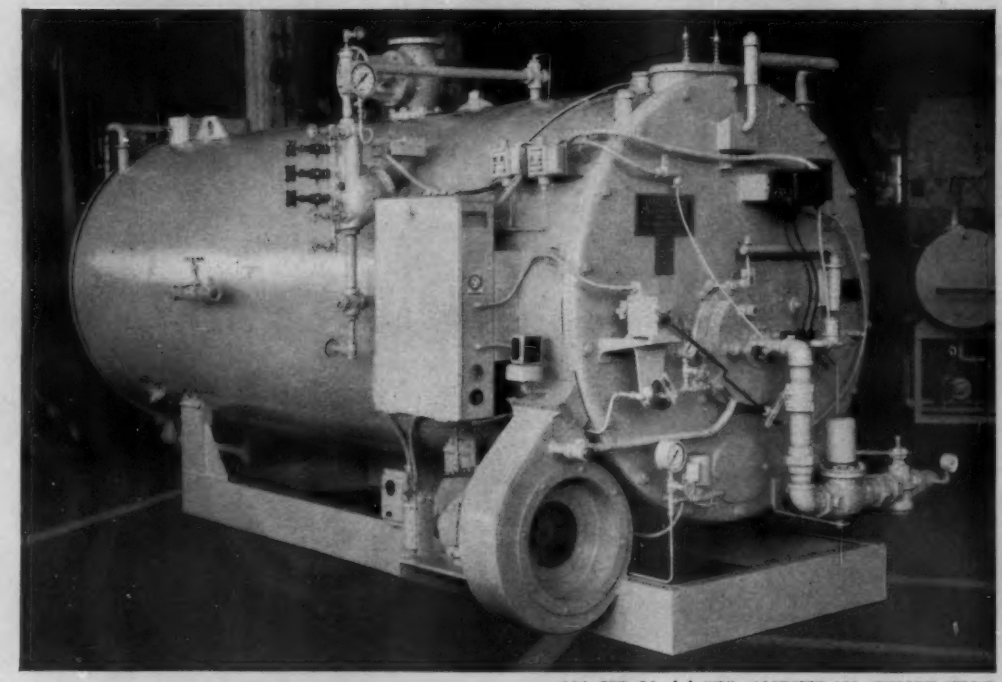
NEW AMESTEAM GENERATOR

MODEL "R"



100 HP Model "R" AMESTEAM GENERATOR

We Kept Our PROVEN DESIGN
We Added "ENGINEERED SIMPLICITY"

Retaining all the time-proven principles and benefits so much in demand in AMESTEAM GENERATORS, the new Model "R" brings you many important improvements.

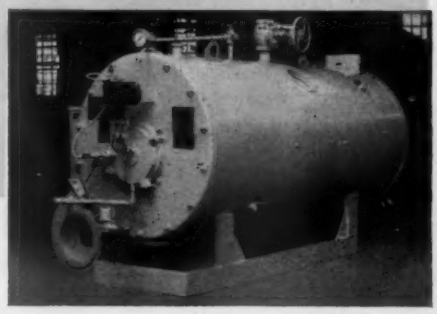
For example, the proven design of the Ames Pressure Vessel is preserved . . . but improved. You'll still find all its reliability, efficiency and simplicity. But, in the Model "R" you'll enjoy these advantages in a much more compact "package" . . . and at a price that will please you.

The Model "R" AMESTEAM GENERATOR is now available in sizes from 10 to 150 HP for pressures up to 250 PSIG, for oil, gas or combination oil-gas firing equipment. Quick fuel switchover is also available. Centrally-positioned auxiliaries and controls simplify your operating procedures.

Like all AMESTEAM GENERATORS, the Model "R" is shipped to you in firing condition, completely inspected and equipped to comply with the local, state or insurance codes specified. All you need to do is connect it up and put it to work.

Investigate the many extra bonus features awaiting you in the new Model "R". Write us today for new Model "R" Bulletin and name of your nearby AMESTEAM representative.

- **SURPRISINGLY COMPACT**
  Saves Floor and Operating Space
- **GUARANTEED 80% EFFICIENCY**
- **CENTRALIZED CONTROLS**
  Save Operating Time
- **NEW FLEXIBILITY OF INSTALLATION**
- **NEW EASE OF MAINTENANCE**
  Conserves Manpower



50 HP Model "R" AMESTEAM GENERATOR

AMES IRON WORKS, INC.

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Do you worry about control circuit installation costs WHEN YOU'RE PLAYING GOLF?

You shouldn't! Why not concentrate instead on breaking 90?

Many of your control circuit installation problems, including the cost problem, can be solved if you'll specify and use Rockbestos PNR 600 volt control cable — the cable that's been proven over and over again through more than 14,000,000 feet of installations.

Here's why Rockbestos PNR is your best buy in control cables:

- With it you save on conduit and fittings, cut installation costs.
- Rockbestos PNR lets you pull a 12 conductor control cable in conduit which is now carrying ordinary six or seven conductor cable.
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ROCKBESTOS

PERMANENTLY INSULATED WIRE AND CABLE

PNR Small Diameter Control Cable

MORE THAN 14,000,000 FEET IN SERVICE

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Prepared by B. A. Wasil, Structural Engineer

STRUCTURAL DESIGN OF AN INDUSTRIAL BUILDING PART IV

THIS BRIEF concludes the series on the structural design of an industrial building. In the previous Briefs, the governing data was established and designs were completed for the purlins, truss, truss bracing, crane girder, eave strut and girts. This Brief will conclude by designing wall bracing, column, bracket for crane girder and the column base plate.

In discussing the design of the column, consideration will be given to the wind load upon the column and its effect on the truss. The truss will then be reviewed for possible effect of wind stresses.

Design of Wall Bracing

Cross bracing will be provided in the end panels of the longitudinal walls, as shown in Part I. The bracing, together with the eave strut, gives stability to the building in the long direction. For this small building, the outside panels only need be braced.

The cross bracing will be made up of double angles and will be connected by a gusset plate where they cross. They will be designed in a similar fashion to the lower chord roof truss bracing.

The length of the member is: $25\sqrt{2}=35.4$ ft. As a secondary compression member, the limiting l/r ratio shall be 200.

Since in the plane of the wall, the unsupported length is ½ that in the transverse plane, a double angle will be selected that has an r on the strong axis about double that of the r on the weak axis.

The strong axis r should equal:

$$\frac{35.4 \times 12}{200} = 2.12 \text{ in.}$$

It would appear that 2 angles, 5 × 5 × ⅜ in., are the most economical. However, these angles would have to be oriented such that the y—y plane is in the plane of the wall. Since the angles cannot be connected to the exterior flange of the column and not interfere with the girts, they must be connected to the interior flange.

This location, however, will require an additional 5⅜ in. clearance from the column face to the center line of the crane rail. As will become obvious, in the design of the column and the crane girder bracket, such an increase in clearance will make for a larger column and bracket. It is therefore more economical to provide wall bracing of 2 angles, 7 × 4 × ⅜ in., long legs back to back. For this configuration, r (x-x) = 2.27, r (y-y) = 1.43, with no space between the legs.

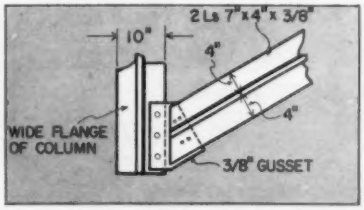


Fig. 1. Typical cross bracing joint

Design of Column

The column is subjected to several loads: the roof loads as carried down from the truss; the crane girder load; the wind load introduced from the girts. When the wind load is coupled with the other loads, the allowable stress may increase by 33⅓ per cent. The load as introduced from the truss is assumed to be carried down axially through the center of gravity of the column, whereas the crane girder load is introduced eccentrically and will produce moments in the column as well as an axial load. The wind will produce moment in the column only.

From Part II of this design, the load from the truss is 31.05 kips. From Part III, we note that the maximum crane girder load is 36.1 kips. If we assume a 10-in. column, then the crane load eccentricity will be 15 in.

At the point where the crane girder bracket frames into the column, there is a moment of 25.3 ft-kips and a vertical load of:

Truss	31.05 kips
Crane	36.10
Wall & girts (See Part III)	2.35
Est. wt. of column (33 × 12.37)	0.42
Total wt.	69.92 kips

It is necessary to design a column that will resist the forces and moments since it is obvious that the combination of forces and moments at the bracket are the governing factors in the design of the column. The column, then, must resist:

1) For basic stresses
P = 69.92 kips
M = 25.3 ft-kips

or 2) For 33⅓ per cent increase
P = 69.92 — 3.28 = 66.64 ft-kips
M = 73.9 + 19.8 = 93.7 ft-kips

It should be noted that since the wind load moment adds to the crane load moment on the leeward side, we use the 65.0 ft-kip load coupled with the 25.3 ft-kip load, or 73.9 ft-kip load coupled with the 19.8 ft-kip load on the windward side, whichever is the larger.

As a compression member, the column is laterially supported in its weak direction at maximum six-foot intervals, and in its strong direction at 25-ft intervals. As a beam, the compression flange has an un-supported length of 16.63 ft.

It appears as though the vertical

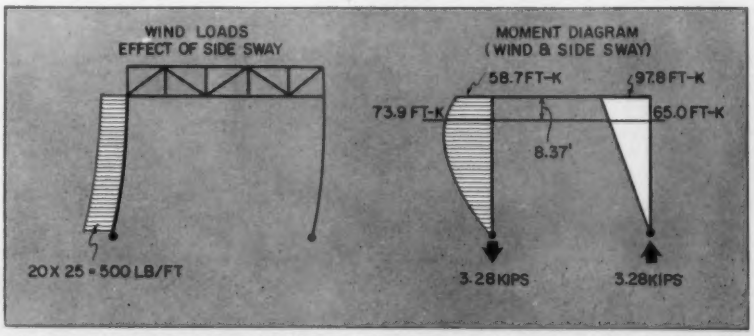


Fig. 2. Two diagrams show loading effects, moment diagram of wind on building

loads plus the wind loads will govern the design, so we shall design for this condition and then check the case of vertical loads only.

Try 10WF49

r (weak axis) = 2.54

r (strong axis) = 4.35

$$l/r = \frac{6 \times 12}{2.54} = 28.4$$

$$\text{or } l/r = \frac{25 \times 12}{4.35} = 69.0$$

Thus f_a = 14,690 psi

$$\frac{ld}{bt} = \frac{16.63 \times 12 \times 10}{10 \times .558}$$

= 358, less than 600

Thus f_b = 20,000 psi

A = 14.40 sq. in.; S = 54.6 cu. in.

$$\frac{\frac{66{,}640}{14.40}}{14{,}690} + \frac{\frac{93{,}700 \times 12}{54.6}}{20{,}000}$$

= 0.315 + 1.028

= 1.343, greater than 1.333

This indicates an overstress of

$$\frac{0.10}{1.333} \times 100 = 0.75 \text{ per cent}$$

Overstress amounting to no more than three per cent is usual design office practice. For this reason, the 10WF-49 section will be used.

To check for vertical loads:

$$\frac{\frac{69{,}920}{14.40}}{14{,}690} + \frac{\frac{25{,}300 \times 12}{54.6}}{20{,}000}$$

= 0.331 + 0.278

= 0.609, less than 1.000

Column section is satisfactory.

Wind and Crane Load Effect on Truss

We note that the crane introduces a small moment into the truss whereas the wind introduces a rather sizable effect on the truss. The moments are taken out as tension and compression on the upper and lower chords of the truss. However, members of a truss, in resisting wind forces, may be considered as secondary members and any member that was designed as a main tension member but then goes into compression due to wind may allow as much as 240 for an l/r ratio.

The wind also introduces shear into the truss which will be taken out by the verticals and diagonals. However, these are small and will be neglected in their effect. The greatest effect will be felt on the exterior panel upper and lower chord members, since the moment arm increases due to the truss rise and also the moment due to wind decreases to the center.

Thus, due to wind:

$$L_0L_1 = + \frac{97.8}{4} = + 24.4 \text{ kips}$$

$$\text{or } - \frac{58.7}{4} = - 14.7 \text{ kips}$$

Since for vertical loads there is a zero stress in this member and it is safe for 20 x 30.8 or 61.8 kips in tension (See Part II) then it is satisfactory in wind.

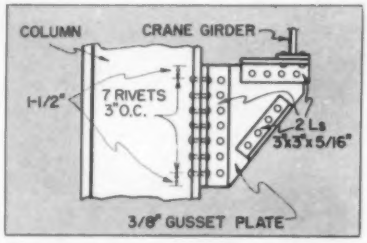


Fig. 3. Typical crane girder bracket

Figure 3 shows the bracket that will be used to support the crane girder. This type of bracket subjects the rivet that connects the bracket to the column to both tension and shear stresses. The determination of the stresses in such a bracket, based upon elastic theories, is rather uncertain due principally to the lack of knowledge of the tension that develops in the rivet when it cools. For this reason, the procedure will be Case 1 of "Rivet Groups Under Eccentric Application of Load," found on page 266 of the AISC Construction Manual.

For this case:

P = 36.1 kips, l = 10 in., ¾-in. rivets, 3-in. pitch. Rivet value for ¾in. rivet in single shear is 6.63 kips. Thus $C = \frac{36.1}{2 \times 6.63} = 2.72$

From Case 1, interpolating between l = 9 in. and l = 12 in., we find that 7 rivets are required in each of two rows.

Column Base Plate

The column load will be transmitted to a concrete footing by means of a base plate. We shall assume an allowable bearing pressure for the concrete of 600 psi. The load going into the footing is:

Truss	31.05 kips
Crane	36.10
Wall and girts (47 x 24 x 5 girts)	5.88
Column (29 x 49)	1.42
Total	74.45 kips

Say 74.5 kips

Required area of base plate is:

$$A = \frac{74{,}500}{600} = 124 \text{ sq. in.}$$

Use a plate 12 in. by 12 in. The thickness of the plate will be determined to safely resist the bending moment created in the plate. If w is the bearing in the plate, then the moments per inch are:

$$M_x = \left[\frac{D - d}{2}\right]^2 \frac{w}{2}$$

$$M_y = \frac{(B - b)\ B\ w}{8}$$

The larger of the two will be used to determine the thickness.

For our problem, w =

$$\frac{74{,}500}{144} = 517 \text{ psi}$$

$$M_x = \left[\frac{12 - 10}{2}\right]^2 \times \frac{517}{2} = 259$$

$$M_y = \frac{(12 - 10)\ 12 \times 57}{8} = 1550$$

Since $t = \sqrt{\frac{6M}{f}}$

then $t = \sqrt{\frac{6 \times 1550}{20000}} = 0.683$ in.

say ¾ in.

Use 12 × 12 × ¾ in. base plate.

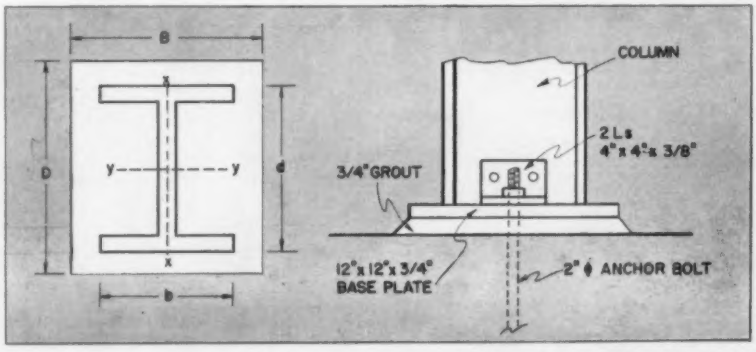
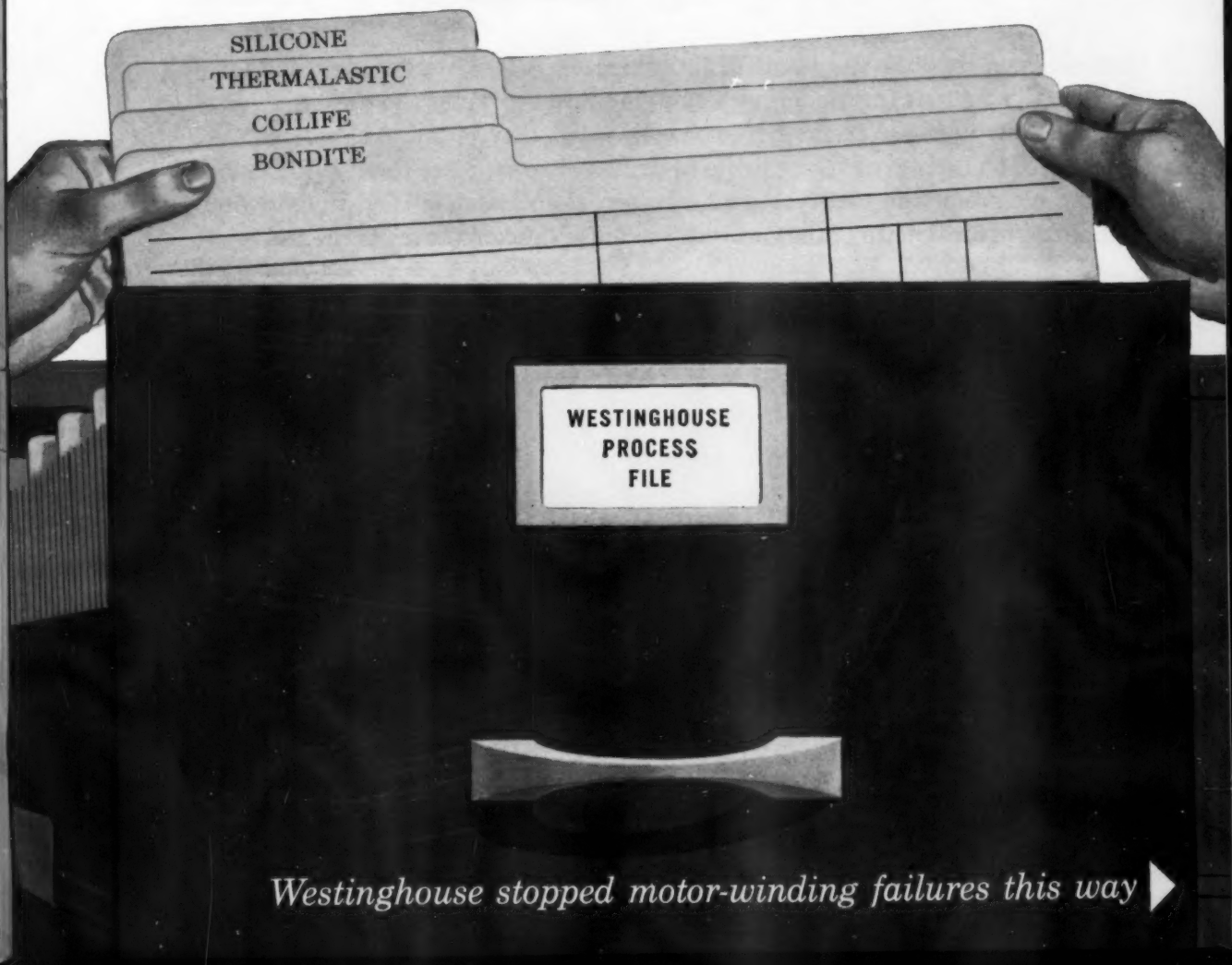


Fig. 4. Plan and elevation of column positioned on plate. Anchors are one-inch bolts

Westinghouse maintenance services provide . . .

LONGER MOTOR LIFE...INCREASED PRODUCTION

Westinghouse draws on a 70-year "file of experience" in the design, manufacturing and repairing of electrical and mechanical equipment to find the best solutions for all your maintenance problems. MA-7002-1



Westinghouse stopped motor-winding failures this way

Motor and pump in operation showing extent of corrosive condition.

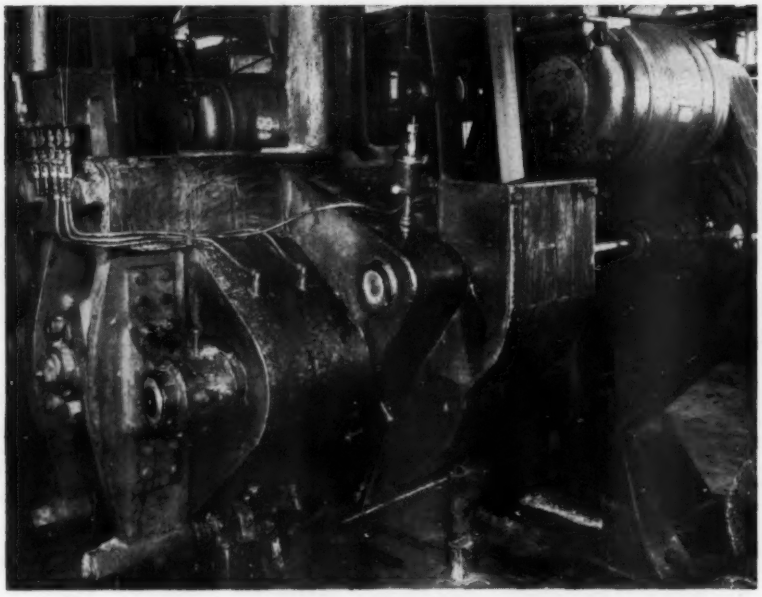
No motor-winding failures in 3 years

Hygrade Food Products Corporation, national meat packers, were only getting 4 to 8 weeks service from motor windings which were subject to water and salt brine corrosion. The Westinghouse engineer recommended that they rewind and protect these motors with an exclusive Westinghouse insulation varnish. Since the first motor was rewound and protected by this process 3 years ago, Hygrade has not had a motor-winding fail due to breakdown of the varnish by action of the corrosive moisture and brine.

MA-7002-2

In Westinghouse Repair Shops motors and equipment are examined and tested carefully during teardown.

Complete rewinding can effect savings for you . . . more production . . . less downtime . . . lower maintenance costs.



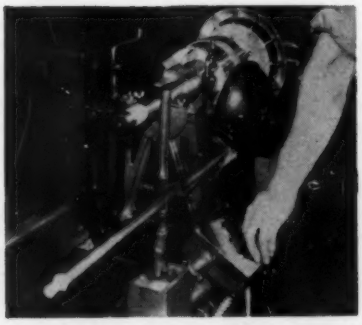
Oil-expelling machines at Corn Products Company where corn kernels are mashed and the expelled oil is sent to the refinery for ultimate use as Mazola Oil.

40% savings by rewinding

Corn Products Company wanted to increase production in their oil-expelling process. To do this would require operating at higher hp and higher speeds. Westinghouse solved this by rewinding the motors and uprating them from 20 to 25 hp, 860 to 1200 rpm. This gave Corn Products the needed production boost and saved them about 40% of the cost of purchasing new motors.

MA-7002-3

Rebuilt motor ready for testing.



Electrical tests make sure the job meets specifications. After final tests the motor is delivered to you with the same guarantee as a new motor.

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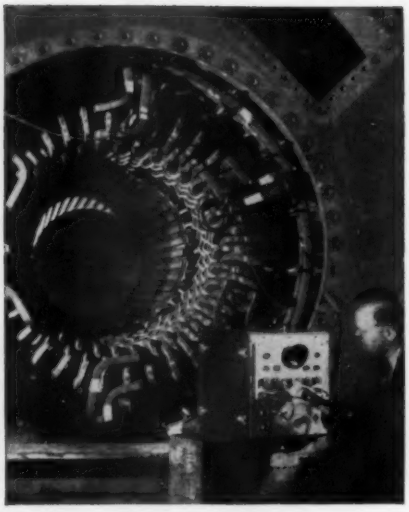
Get these Westinghouse benefits ▶



men... **materials...** **machines...**

keep production up... maintenance down

men...

Westinghouse engineers are specially trained and equipped to use the latest methods and processes for repairing and rebuilding your equipment. In each of the 38 Westinghouse repair plants there are experienced specialists who do quality repairs to help you keep production up and maintenance costs down.

materials...

34 Westinghouse Renewal Parts warehouses, spotted across the nation, offer the latest improvements in materials for the repair of your equipment. Genuine Renewal Parts bring rebuilt apparatus up to new equipment performance standards. Westinghouse helps you maintain minimum parts inventories.

machines...

Every Westinghouse repair job is performed in accordance with rigid engineering standards, with the most modern processing and testing equipment available. Conclusive tests of turn-to-turn insulation are made with high-voltage, high-frequency current, surge comparison equipment. Both methods are Westinghouse developments. Rotating apparatus is dynamically balanced, preventing damaging vibrations, assuring safe, smooth operation and longer operating life. Complete machine facilities in every repair plant provide all the tools needed for any repair job. Your repair job is done right, tested right and at the right time. Westinghouse provides round-the-clock service for repair work of an emergency nature.

Let Westinghouse show you its repair facilities. Call your Westinghouse salesman or write: Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Pennsylvania. MA-7002-4

YOU CAN BE SURE...IF IT'S Westinghouse

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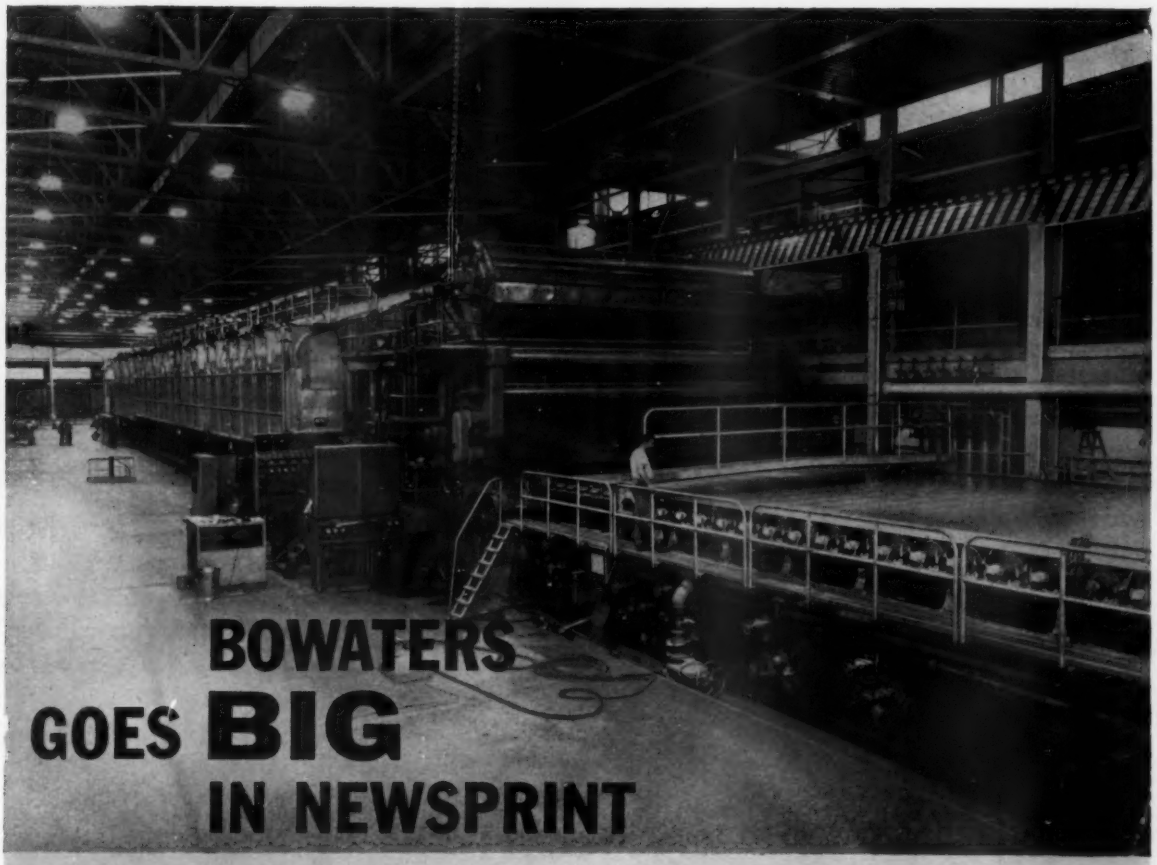

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F. H. McGRAW & COMPANY

engineers and constructors to American industry

Bowaters Southern Paper Corporation became one of the major newsprint producers in the United States in January of this year. That was when Bowaters' third machine, designed to produce newsprint at speeds up to 2500 feet every minute, went into operation at the Calhoun, Tenn., plant.

The complex new machinery, which raised plant production capacity to 300,000 tons a year, weighed close to seven and a half million pounds. It was installed, to tolerances as fine as one five-thousandth of an inch, by the skilled, experienced mechanical erection engineers and technicians of F. H. McGraw & Company.

The McGraw paper mill division has compiled an outstanding record of achievement in mill construction and precision installation for leading firms such as Container Corporation of America, Hartford City Paper Company, Kimberly-Clark, Coosa River Newsprint and others. In paper – as in other major American industries – McGraw men, methods, materials and machines are relied upon to solve tough problems of design, construction and installation, and to achieve on-time (or before-time) completion.

A McGraw engineer would be happy to discuss your construction or installation problems with you . . . no obligation, of course.

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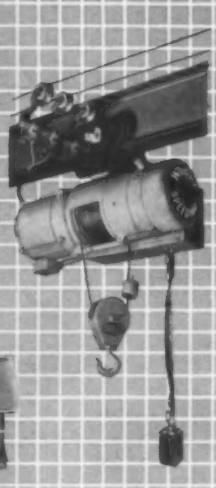
WRIGHT Electric Hoists f

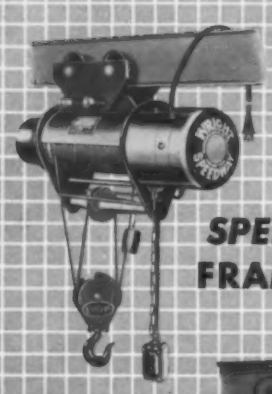
NEW ELECTRIC CHAIN HOIST

- The new WRIGHT Electric Chain Hoist is available in two size capacities: 300 to 2000 lbs. (single chain) and 3000 to 4000 lbs. (double chain). It is safe, easy to operate, rugged and durable. It is exceptionally valuable for use on production lines, over machine tools or any shop location where space is at a premium.



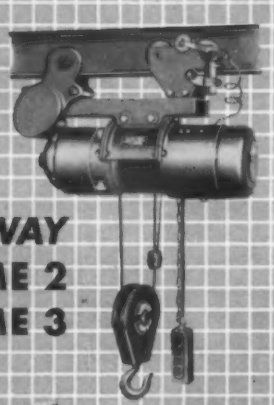
2-SPEED *SPEEDWAY* FRAME 1

- WRIGHT now offers a *Speedway* Two-Speed Hoist in the Frame 1 size. It permits precise, gentle positioning of production work in capacities from ¼ ton to 1 ton. This hoist gives a fast lifting and lowering speed —and a slow speed (¼ the rate of the fast speed) by the use of 1800/450 RPM motors.



SPEEDWAY FRAME 1½

- WRIGHT *Speedway* Electric Hoists are built to meet the many and varied demands of modern high-speed production. Many design improvements minimize maintenance costs and down-time. The Frame 1½ Hoist will handle loads of from 1½ to 2 tons. The Type L-1½ shown is 4-part reeved and intended for relatively slow lifting speeds.



SPEEDWAY FRAME 2 FRAME 3

- WRIGHT Frame 2 *Speedway* Electric Hoists are capable of handling loads from 1½ to 6 tons. The Frame 3—from 1½ to 10 tons. WRIGHT *Speedway* Hoists are available with single or variable speeds and with a wide variety of mounting arrangements to meet specific requirements.

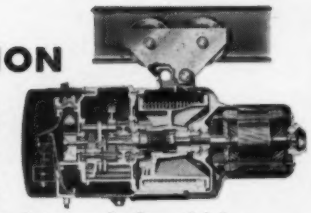
FOR COMPLETE INFORMATION

Ask for the following booklets for complete information on WRIGHT Hoists and Crane components: Speedway Hoists (Frame 1-1½) Booklet DH-133B, (Frame 2 and 3) Catalog E-55B • Motor Driven Cranes—Underhung, Single Bridge—Bulletin #227; Top Running Cranes—Bulletin DH-448 or DH-449 • Crane Drive Units—Booklet DH-431A • Hand Traveling Cranes—Bulletins DH-468 and DH-348B.

s for Lowest Final Cost

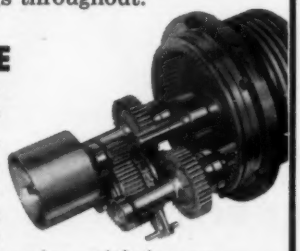
These features make WRIGHT Speedway Hoists your best buy for—

MORE PRODUCTION



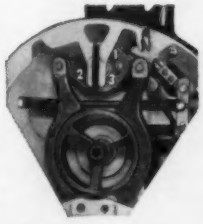
Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

LONGER LIFE



Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

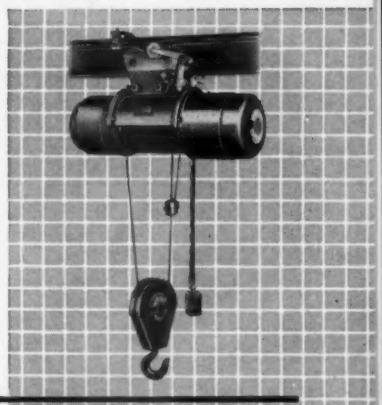
EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

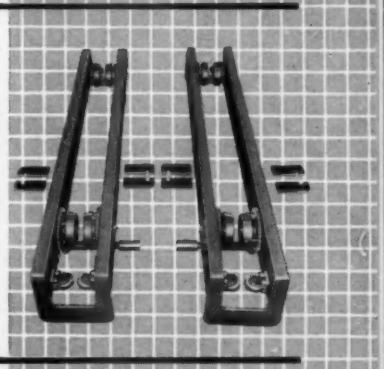
Better performance at lower cost by using WRIGHT units for local-built cranes

SPEEDWAY ELECTRIC HOIST



Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

END TRUCKS



For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

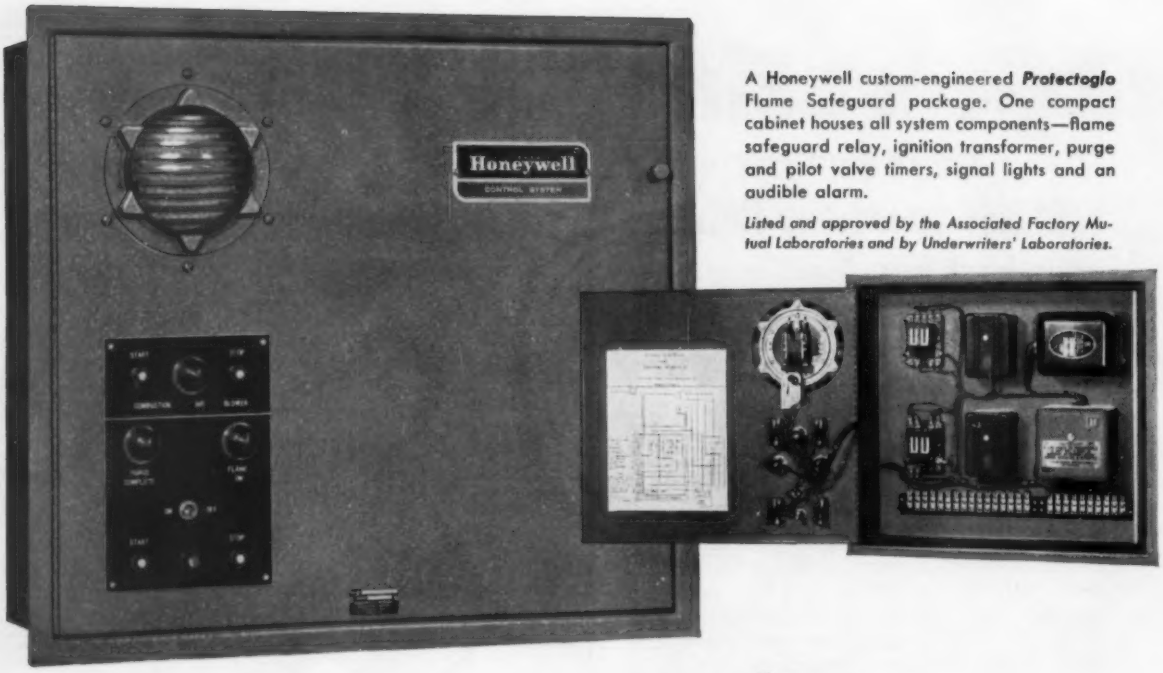
CRANE DRIVE UNIT

For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

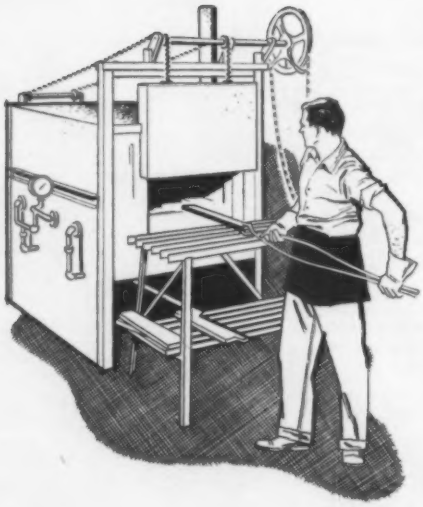


A Honeywell custom-engineered ***Protectoglo*** Flame Safeguard package. One compact cabinet houses all system components—flame safeguard relay, ignition transformer, purge and pilot valve timers, signal lights and an audible alarm.

Listed and approved by the Associated Factory Mutual Laboratories and by Underwriters' Laboratories.

Protection against...

- ***Production loss***
- ***Property damage***
- ***Personal injuries***



Here's fast, sure flame failure protection for any plant. But more than protection, Honeywell flame safeguard systems offer the convenience of automatic light-off and programming for automatic operation of dryers, ovens, furnaces . . . *all* fuel burning equipment.

Flame safeguards prevent the continued flow of unignited fuel into combustion space in event of flame failure or failure of ignition. And they prevent starting the burner before purging has been completed.

Programming variations include: cutoff or relight service; automatic, manual or standing pilot ignition; pre-purge; post purge; immediate or delayed valve opening.

Honeywell flame safeguard systems are designed for oil, gas or dual fired equipment . . . simple or complex . . . single or multiple-burners. We'll help with planning and startup.

Call your nearby Honeywell field engineer for details. He's as near as your phone.

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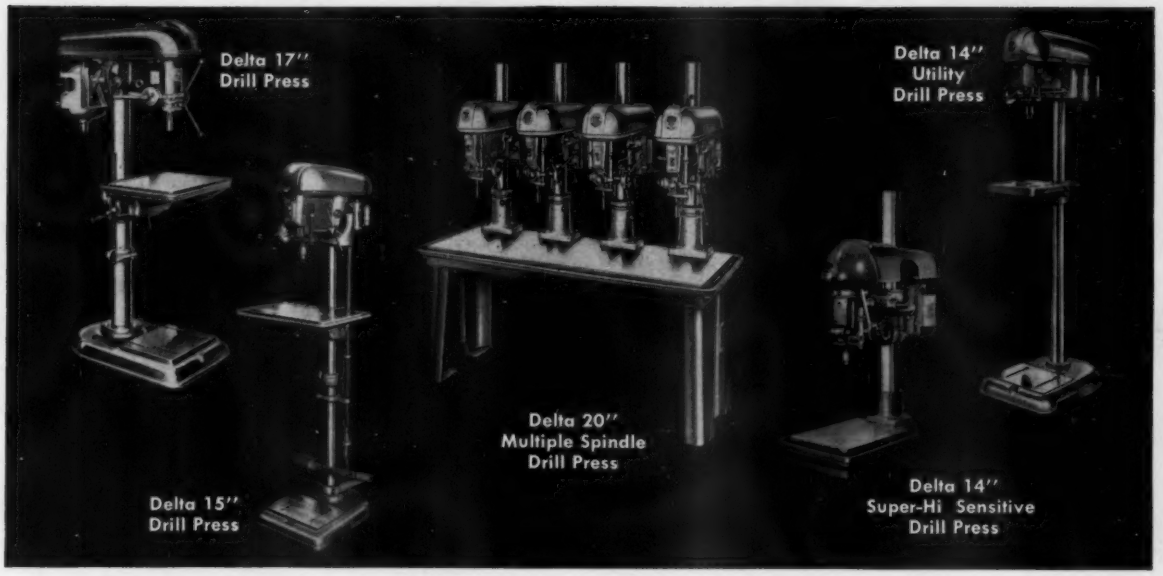
ROCKWELL-BUILT

DELTA drill presses


Delta 17" Drill Press
Delta 15" Drill Press
Delta 20" Multiple Spindle Drill Press
Delta 14" Utility Drill Press
Delta 14" Super-Hi Sensitive Drill Press

...improve production and cut costs

There are three basic reasons why Delta Drill Presses improve production and cut costs: They're VERSATILE—do the work of many expensive, single-purpose machines. They're FLEXIBLE—can be used singly or in combination—readily adapted to automated operations. They're PORTABLE—easily moved to the work to reduce materials handling, eliminate bottlenecks.

BETTER ENGINEERING —Delta—power tool pioneer—gives you quality tools built to turn out quality work. They're precision engineered for greater accuracy—hold extremely close tolerances, reduce costly rejects—even inexperienced operators turn out fine work.

RUGGED CONSTRUCTION —You get years of high standard performance under hard, continuous operation with every Delta Drill Press. They're built to last—and built to give you lower maintenance costs.

OVER 160 MODELS —Delta Drill Presses are available with: Standard or Production Table, Key Chuck or Morse Taper Spindle, High or Slow Speed, Standard or Power Feed —and in Floor, Bench or Multiple Spindle Set-Ups.

CHOOSE FROM THE WORLD'S MOST COMPLETE DRILL PRESS LINE —Get all the facts—compare—then make up your *own* mind! Your Delta Dealer is listed under "TOOLS" in the Yellow Pages.

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☐ Please send name of my nearest Delta Dealer.

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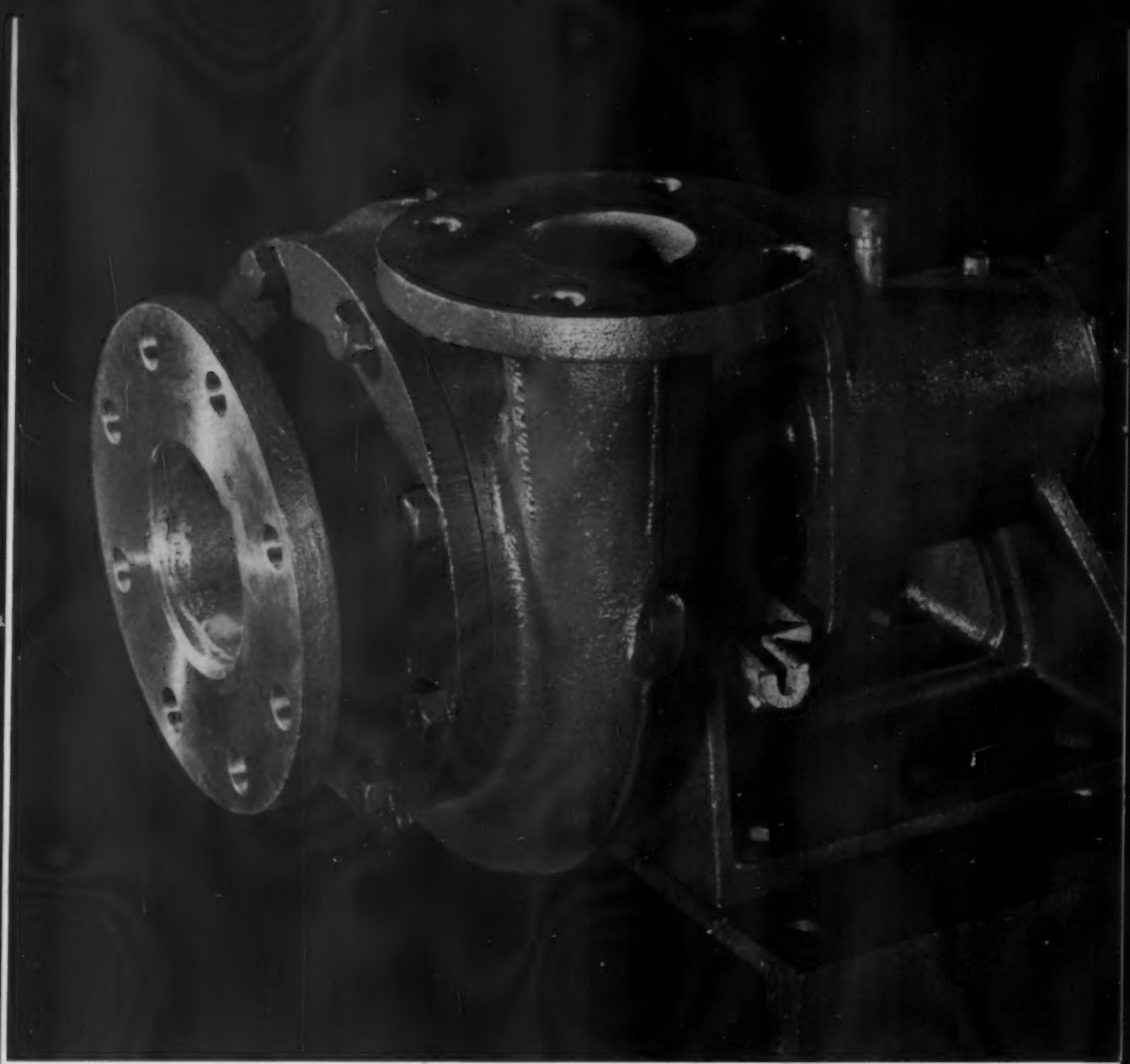
For more facts circle 562 on Reply Card



HOW TO BUY A $750

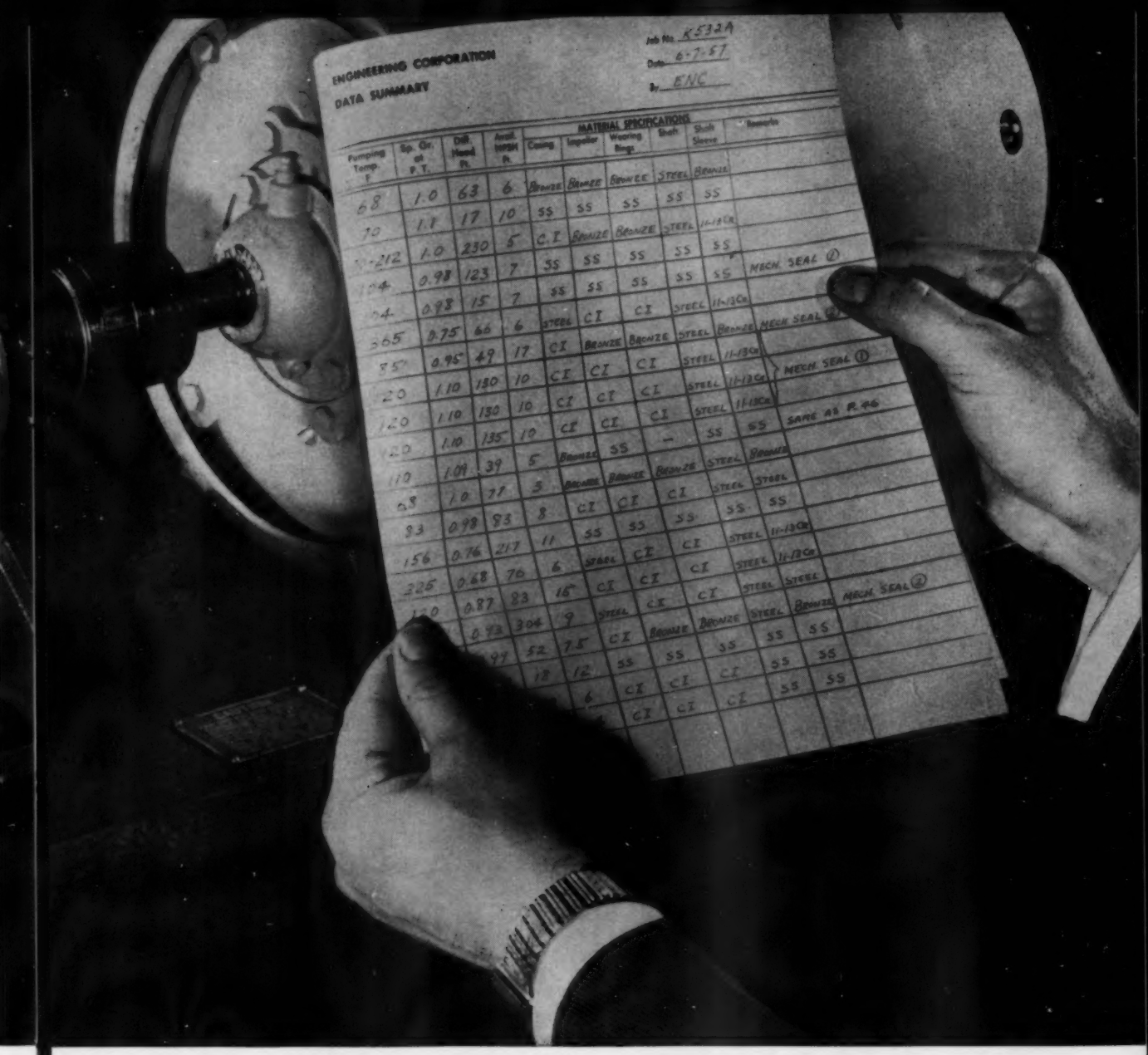
When you need a "special" pump, Worthington's SESC (Standard End Suction Centrifugal) line will often prove the low-cost answer.

For example, the chart above shows specifications for 21 different pumps, with a variety of materials of construction, which would ordinarily involve manufacture of special pumps. However, because all of these materials are available from the SESC line, the pumps can be bought at big savings.

The secret of Worthington's ability to give you many normally special pumps at standard prices is the flexibility of the SESC line. *Parts* have been standardized, but not *pumps*. As a result, you can literally "custom-build" your pump to get exactly the right features to meet your requirements.

70,480 COMBINATIONS TO CHOOSE FROM. You have a choice, for example, of four materials of construction—iron, steel, bronze, Worthite* and combinations of these. You have a choice of five types of liquid ends and five different drives. You can choose packed stuffing box or mechanical seal operation. In all, there are 70,480 combinations—all built from standard, stocked parts and ready for prompt delivery at competitive prices.

*A high nickel, high-chromium, low-carbon alloy steel. Trademark Reg. U. S. Pat. Off.



PUMP FOR $300!

STANDARDIZATION PAYS OFF LATER. After you have installed an SESC pump, you benefit again from Worthington's broad standardization program. Since all pumps in the line are built from interchangeable parts, your spare parts inventory can be cut as much as 50%. Should repairs or conversions become necessary, parts interchangeability can often mean reduced downtime.

The complete SESC line consists of six separate types of pumps, all suitable for either motor, turbine or belt drive. Ratings range up to 2,700 GPM and 550 ft. head. If you'd like to know more, write for Bulletin W-300-B4. Worthington Corporation, Harrison, N. J.

CUTS MAINTENANCE
If you know one SESC pump, you know them all. From the smallest to the largest the entire line is built to the same basic design. Maintenance men quickly become familiar with its construction details.

WORTHINGTON

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(Advertisement)

TIPS ON TRUCKS

Efficiency? Dependability? Better go 'electric'

No material handling operation can afford to be plagued by low efficiency or excessive downtime. In handling products as perishable as fresh foods, such conditions become intolerable.

Consider efficiency. Under all sorts of conditions—including extreme temperature changes—handling speed and efficiency of electric trucks are relatively unaffected by the variations. The result is a smooth, fast-handling operation with downtime held to an absolute minimum.

Take dependability. With plenty of power to spare . . . and with practically nothing to "go wrong," there's little question. You just can't beat the battery-powered truck.

Better get the 'better battery,' too

And speaking of batteries, that's something you certainly can't afford to overlook or take for granted. Just as there is a big difference between electric trucks and gas trucks, so is there just as big a difference between batteries.

Extra-capacity C & D *Slyver-Clad®* batteries are built to give you maximum potential from your electric trucks. Plates are longer, heavier, designed so as to eliminate "shedding" of active materials, thus providing more power and prolonging battery life.

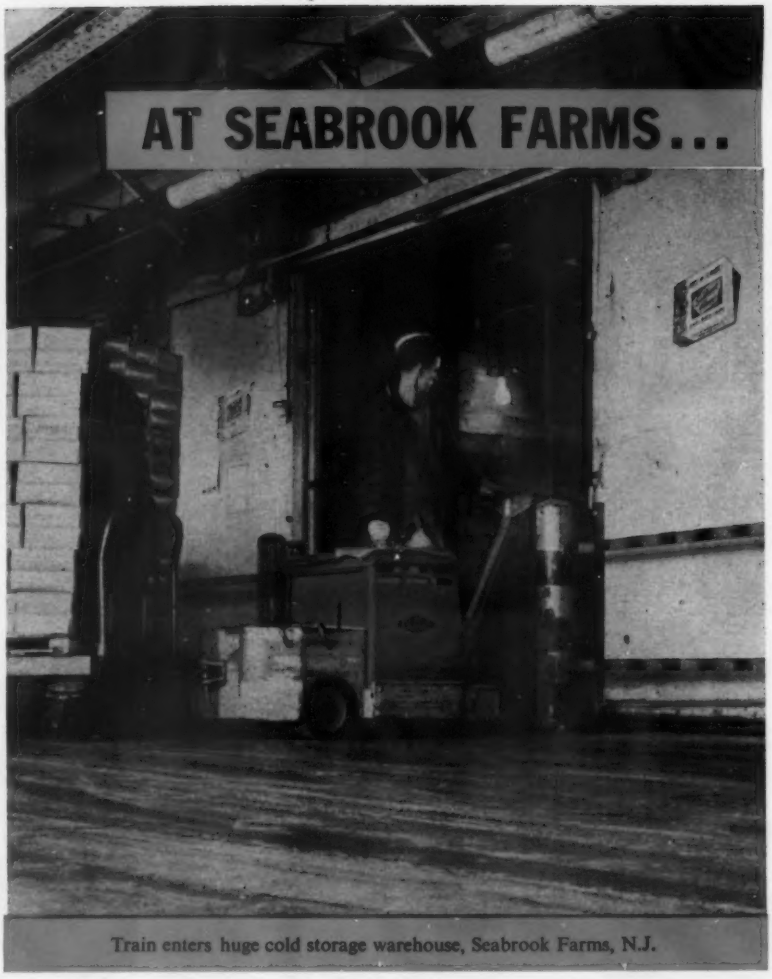
In addition, C & D's new *Hi-Impac* cell covers and containers now virtually eliminate truck downtime due to battery breakage.

(It will pay you to check the details on these remarkable motive power batteries. Why not send for the literature offered in the advertisement at right.)

Paired for extra power...

extra-power electric trucks . . .

. . . and extra-power Slyver-Clad batteries, built by C & D.



Train enters huge cold storage warehouse, Seabrook Farms, N.J.

'Electric trains' store million pounds of frozen food a day

Plenty of power, hour after hour . . . batteries by C & D

Speed, efficiency, and complete *dependability* mark an outstanding material handling operation here at Seabrook Farms. One of America's foremost frozen food processors, Seabrook Farms moves a million pounds of packaged foods into cold storage daily during peak periods.

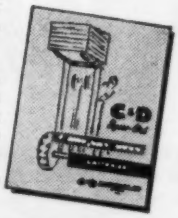
"Electric trains" duck in and out of this 10-below-zero warehouse, pulling 4-trailer, 2650-lb. loads to storage. Electric fork lifts move frozen foods from "ice box" to loading dock for delivery to stores.

Powered by extra-capacity C & D *Slyver-Clad®* batteries, Seabrook's electric trucks and tractors are unaffected by the extreme cold and temperature changes. Battery power always assures smooth, fast handling . . . with no loss for downtime.

Performance proves why "C&D is a better battery buy"

See how C & D's advanced design principles and extra capacity cut handling costs . . . give your trucks a power boost.

Write for descriptive bulletins.



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BATTERIES, INC.

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SINCE 1906

Sales and service offices in principal cities from coast to coast

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PLANT ENGINEERING
October, 1957

What's Just Ahead in This Issue?

THOSE EPOXIES are always popping up somewhere, wherever the going is the toughest. This time the subject of our attention is doing time resisting acid fume attacks at the plant of Keystone Steel & Wire Co., Peoria. For example, exhaust fan blades that formerly were replaced every three months at $120 per placement are being coated with epoxy and Fiberglas. Eighteen months have passed and they're still going strong. For the whole story, see page 106.

CENTRIFUGING a material seemed to be the answer to bubble removal, but how to do it? This problem was put to the plant engineering department at Douglas Aircraft's El Segundo plant. With maintenance in mind, they designed a centrifuge which has been in use for five months. Other than planned lubrication only a brake adjustment has been necessary. Article starts on page 128.

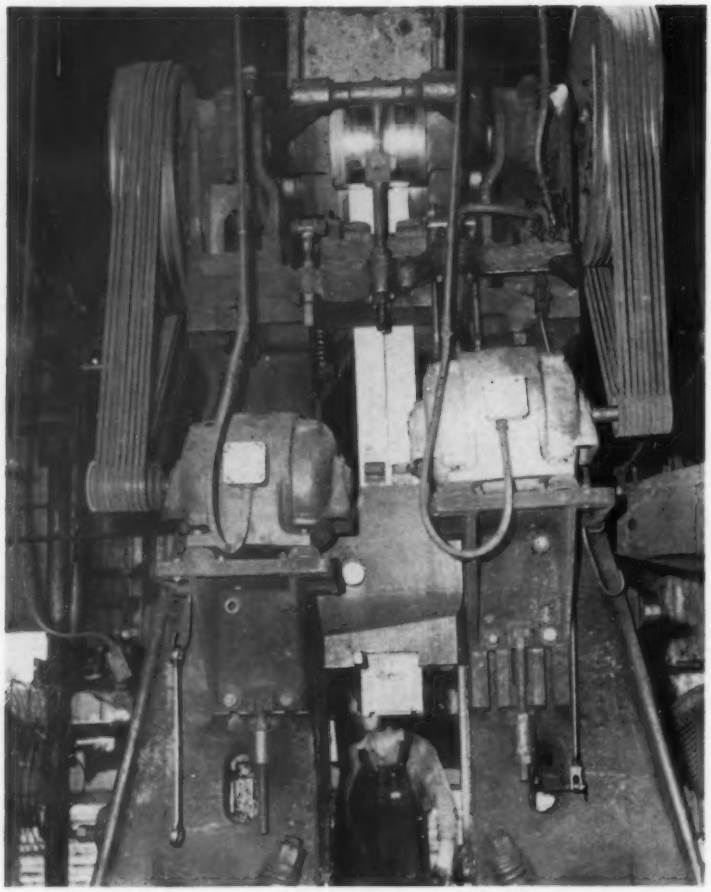
PARKE, DAVIS AND COMPANY, feeling that its lubrication program was on a hit or miss basis, decided to do something about it. They investigated various lubrication record systems and have come up with one which they feel is simple and easy to operate. The system is described on page 100.

HAMMER VIBRATION was pounding the drive motors to pieces in the plant of Proto Tool Co., in Los Angeles. The logical solution: remove the motors from the hammers and mount them on a separate structure. To see how Jim Weeks, Proto's plant engineer, accomplished this job and to check on his success see the article: "Segregation Stops Shimmy" on page 96.

MANY PLANT ENGINEERING readers were recently asked the question: "Do Trolley Busways Pay Off?" If you received one of the questionnaires, did you answer "Yes" or "No?" How do your answers compare with the others? Whether or not you received a questionnaire, you will be interested in the tabulations which appear on page 116.

MAINTENANCE PLUS PHILOSOPHY go a long way toward getting the job done. If the maintenance staff in your plant has a healthy attitude about the work they are doing, then you score 100. If not, test yourself by answering the questions in the "Progress Test" on page 98 to see what areas require additional attention.

HAVE YOU TRIED plastic piping in your plant? If not, you will be interested in the article on page 130 which illustrates how different industries are using plastic piping. If you are already using it, check to see if some of the ideas are new to you and could be used in your plant.



From This

Fig. 1. This is the trouble the platform installation eliminated. Note how right hand motor has canted on its deteriorating motor mounts. This causes misalignment and rapid wear on V-belts. Motor mounts suffer and must be replaced. V-belts, besides wearing, also stretch, which usually means replacing all the belts

Segregation Stops Shimmy—

Separate Mounting Platforms Save Motors from Hammer Shock

AS JIM WEEKS, Plant Engineer, describes it . . . Trouble kept brewing in the forge shop at Proto Tool Company, Los Angeles, California, a division of Pendleton Tool Industries, Inc.

This trouble was centered in the rubber motor mounts used to cushion the seating of the drive motors which were mounted directly on the big hammer frames. The tremendous concussion of each hammer blow, and the vibrations that followed, transmitted directly through the frame of the big hammers, and thence to the heavy drive motors, was just too much. In a very short time the mounts would begin to lose their form and rigidity, the motors would begin to cant in alignment, and the multiple V-belt drives would begin to wear unduly fast, and unevenly.

"This," Mr. Weeks says, "was expensive trouble. There are two motors per hammer, ranging from 15 hp on the 2500-lb hammers to 20 hp on the 4000-lb hammers, thus requiring eight motor mounts per hammer. The mounts cost from $6 to $7 each. Add to this the cost of labor for replacement, of replacing V-belts that had been stretched, and loss of product due to hammer downtime, and the total amount was considerable."

Other problems occurred. Due to the rapid deterioration of the motor mounts, the V-belts had to be adjusted frequently. This added more downtime. The vibrations affected also the conduit and wiring carrying current to the hammer-mounted motors. Insulation would chafe away. Shorts and grounds were frequent and frayed tempers were just as prevalent.

"We finally came to the conclusion that the only way to prevent this recurrent trouble was to remove the motors from the hammer frames and mount them separately," Plant Engineer Weeks said.

This was accomplished by erecting a platform and catwalk parallel to and stretching the length of the hammer line. Heavy-duty 6-in. I-

To This

Fig. 2. This is an end view of the motor-mounting platform. Note how 6-in. I beams were tied between existing steel building columns. To left, not shown in photo, is a catwalk that parallels platform-mounted motors. All electric power services have also been moved to the practically vibrationless platform

beams were used for the platform which spans the gap between the parallel rows of steel building columns. The cross-members of the platform provide a minimum of 9 ft clearance (somewhat more, adjacent to the larger hammers) and because they were tied to existing building columns, interference with existing free floor space was avoided.

Fig. 3. Close-up, from floor level, of two platform mounted motors driving a big forging hommer. V-belt drive has been kept short and efficient by proximity of motors to the hammers

The motors were then removed from the hammer frames and mounted on this platform. Due to the proximity of the platform to the hammer frames, the V-belt drives are just as short and efficient as ever.

Along with the motors, all conduit and wiring, switch boxes, etc., were removed from the hammers and mounted on the platform or the building columns supporting it.

Jim Weeks sums up the results of this innovation in a few words. "We used to purchase motor mounts by the hundreds. Now no motor mounts are installed under the platform-mounted motors. V-belt drive adjustments have been practically eliminated.

Thus it is that constant and secure motor alignment has resulted in a 100 per cent increase in V-belt life. Since relocating the power supply facilities (conduit, wiring, switches, etc.) on the vibrationless platform structure, we have not been bothered with grounds and shorts. We are firmly convinced that, because of these improved operating conditions, motor life and efficiency of operation will be materially enhanced."

George Walls, foreman of the Proto forge shop, points out also that the catwalk included on the motor platform has greatly simplified motor servicing and maintenance.

Their motto has become "Remove everything from the hammer but the hammer and its frame." **End**

Want Tear Sheets?

If you'd like tear sheets of any of the articles in this issue just drop a line to The Editor, Plant Engineering, 308 E. James St., Barrington, Ill. We'll be glad to supply them as long as they last.

In addition to "keeping things running and keeping costs down" maintenance success can also be measured by some intangibles. . . . Author tells how you can judge your own operation on supervision, teamwork, turnover rate and training . . . Costs count, too, as capital utilization graphs show

Maintenance With a Philosophy

Here's an Objective Approach, With a "Progress Test"

By OTTO J. SEIDL, Plant Engineer, Combustion Engineering, Inc., East Chicago, Indiana

BEFORE PRESENTING the story of the philosophy of maintenance at our plant, it may be helpful to review the responsibilities of the Plant Engineering Department.

First, we are charged with the responsibility of maintaining all of the East Chicago properties—including machines, facilities and buildings. There is one exception to this in that the office manager is responsible for the charwomen who clean the various offices. In addition to maintenance we are responsible for the design of specialized equipment and all tools, dies, jigs, and fixtures. Since we use a great deal of specialized machinery this is a large assignment in itself. The preparation of the annual plant forecast regarding new facilities and equipment for the coming year also comes under the heading of plant engineering responsibilities.

Plant layout, plant expansion and fire prevention are prime functions of plant engineering. Still another task is the preparation of machinery replacement analysis data using the MAPI method. Of course, many of these jobs are done with the aid and cooperation of the other departments.

Since we are charged with these diverse responsibilities, it becomes evident that we must have both an engineering group and a maintenance group. And, we must also have an objective for maintenance; this objective will be the subject of this article.

Simply stated, our maintenance goal or objective should be to minimize the cost of utilizing capital —that is, capital goods, such as buildings, machinery and equipment. A graph series, shown on the following page, helps keep this goal in mind.

As an approach to the problem, choose a set of coordinates. Along the abscissa, plot the number of maintenance employees, and along the ordinate, plot dollars. It can be safely assumed that the annual maintenance payroll will be directly related to the number of maintenance employees; not precisely, since different skills command different wages but for purposes of illustration the direct relationship should suffice.

Now assume that we have a plant with zero maintenance men on the payroll. If this were the case a machine tool (or capital) would be extremely expensive since there would be no one available to repair the machine when it broke down. As a result there would be no production and hence no return on the investment.

If there were one maintenance man on the payroll this cost would go down since he would be available for repair work sooner or later depending on what other equipment he would have to

What's Your Rating on this Test?

Is there reduction in unscheduled downtime?

Are you observing your rate of absenteeism?

Do you notice any increase in tool life?

Are you observing your rate of turnover?

Have you noticed any reduction in time it takes to make certain repairs?

Is your maintenance budget variance explainable to yourself?

How is your inventory doing?

Are the men productively occupied?

Is there improvement in housekeeping?

Is there improvement in the safety record?

Are the men cordial and friendly?

Is there a perceptible improvement or change in relations with other departments? (Are you producing satisfied customers?)

Are you eliminating any spots which have always seemed to cause difficulty?

Are you making any progress towards standardization?

What kinds of suggestions are you getting, if any?

Does everyone really pull together in an emergency situation?

What kinds of grievances are you getting?

Do you have trouble in obtaining developable people when you have vacancies?

Do you have confidence in the decisions that you make?

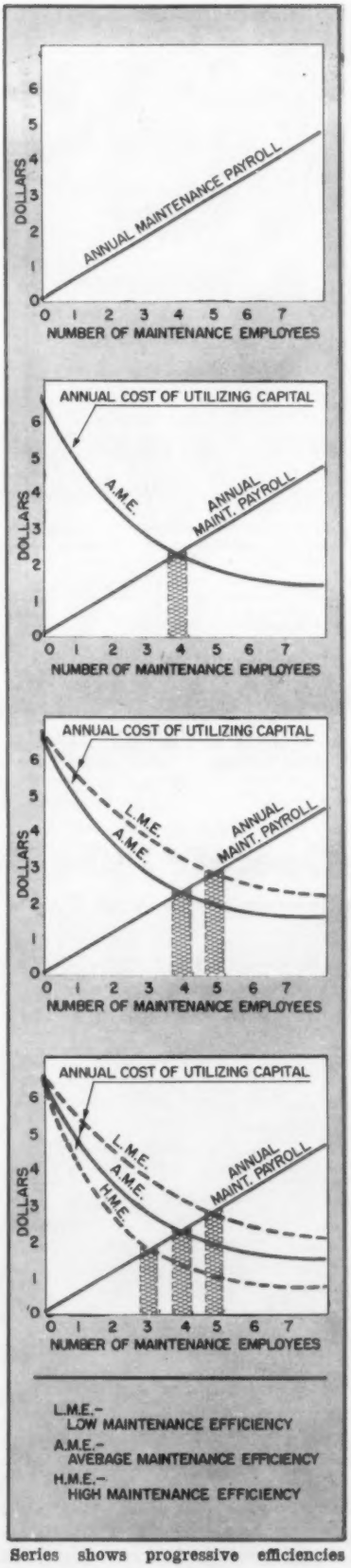
service. As you put on more men your costs go down to the extent that if you had a man for each machine, etc., you could probably operate with the very minimum of lost production time. This graph can just as easily apply for larger numbers of men and greater expenditure of dollars merely by adding ciphers to the prefix.

Point of Diminishing Returns

There is every indication that the curve called "Annual Cost of Utilizing Capital" is not linear. About all we can say about it is that it is a curve and somewhere along its path it intersects the line called "Annual Maintenance Payroll." To economists, this point of intersection is known as the point of diminishing returns. To us, it means that on either side of this point we are operating at something other than peak efficiency. An important point to remember is that most organizations operate somewhere close to the point of diminishing returns since when you get on either side the results are quickly noticeable. (For example, if you are operating to the left of this point things that should be done are not getting done—in other words, too large a backlog shows up.) On the other hand, if you are to the right side of this point everything that you want done gets done with time left over for the men to be idle. This is not the full story, however; things are not just this simple.

All maintenance forces are not identical in efficiency, as the next set of curves points out. For lack of a better name let us call one average and the other low. It can be readily seen that the average organization can accomplish more with fewer people than can the one which is rated low. As a result the average organization operates with less overall cost. The final graph depicts three curves, the newest curve showing still another level of efficiency. This organization would operate at the lowest overall cost meaning that it best fulfills the bill of "Minimizing The Cost of Utilizing Capital."

The problem then becomes a question of "How can we increase



Series shows progressive efficiencies

our efficiency?" Since we are aware of the problem by virtue of the fact that we have established a goal or an objective which appears logical, we can intelligently plan our policies and actions.

The first thing that comes to mind is the question of attitudes. To our way of thinking the attitude of the men is, to a very large extent, determined by the management group. If the management group does not display a healthy attitude it will be reflected in every segment of the organization.

We believe that the degree of productive effort is directly related to the effectiveness of the following factors:

Quality of leadership

Kind of working conditions (with respect to adequacy, safety and cleanliness).

Adequate tools and equipment (both with respect to what they work with and what they work on).

Perform meaningful work (as against the daily winding of a seven day clock).

Degree of training

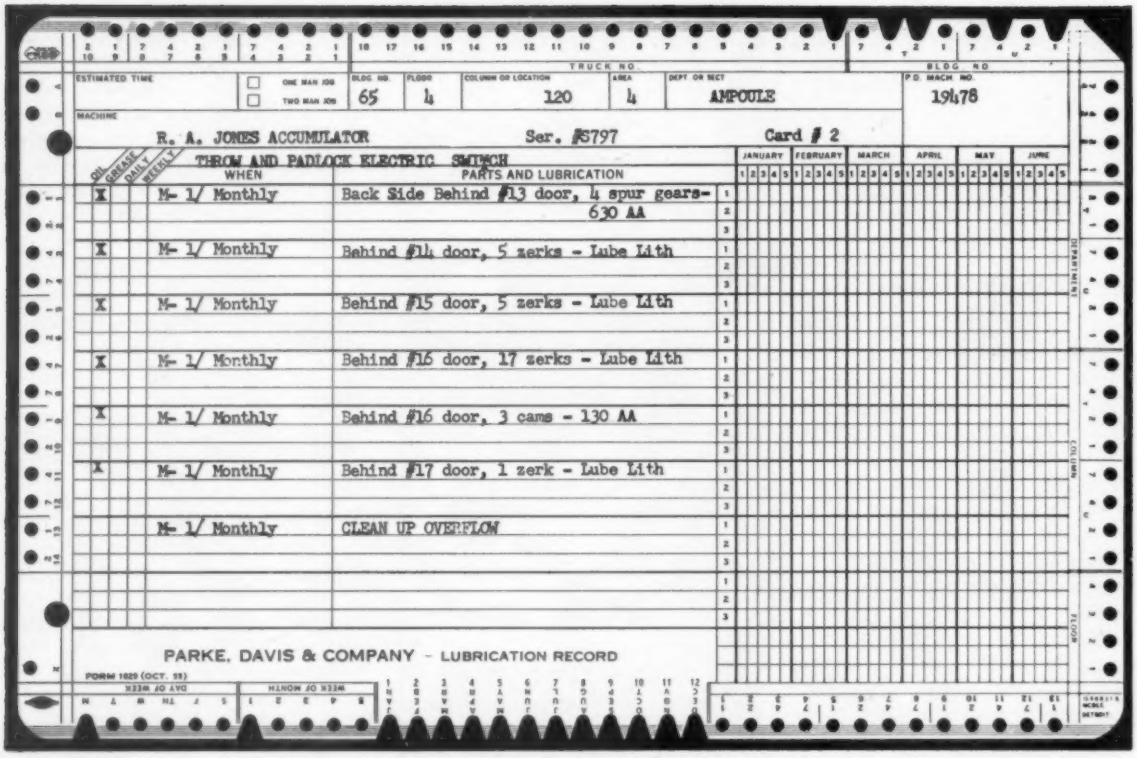
Association with a successful enterprise. (as has been said many times, "nothing succeeds like success.")

How Can You Judge?

In the final analysis, we must come to one conclusion—we judge and are judged by performance. What are the criteria by which we judge the performance of a maintenance organization? Various topics have been discussed, all of which were designed to improve performance. Very early we stated that the objective of maintenance was to minimize the cost of utilizing capital. This, I believe, is valid.

What all of us want to know is—how close are we to meeting our objective?

There are several means available for evaluating your performance, which will at least tell you whether or not you are heading in the proper direction. A list of a few of these means is presented earlier in the article. While not complete, it will suffice to point out some of the means available—and, of course, they are not in order of importance. **End**



WHEN	PARTS AND LUBRICATION
X M- 1/ Monthly	Back Side Behind #13 door, 4 spur gears- 630 AA
X M- 1/ Monthly	Behind #14 door, 5 zerks - Lube Lith
X M- 1/ Monthly	Behind #15 door, 5 zerks - Lube Lith
X M- 1/ Monthly	Behind #16 door, 17 zerks - Lube Lith
X M- 1/ Monthly	Behind #16 door, 3 cams - 130 AA
X M- 1/ Monthly	Behind #17 door, 1 zerk - Lube Lith
M- 1/ Monthly	CLEAN UP OVERFLOW

ESTIMATED TIME — BLDG NO. 65 — FLOOR 4 — COLUMN OR LOCATION 120 — AREA 4 — DEPT OR SECT AMPOULE — P.O. MACH NO. 19478

MACHINE: R. A. JONES ACCUMULATOR — Ser. #5797 — Card # 2

THROW AND PADLOCK ELECTRIC SWITCH

JANUARY FEBRUARY MARCH APRIL MAY JUNE

PARKE, DAVIS & COMPANY - LUBRICATION RECORD

FORM 1029 (OCT. 55)

Fig. 1. Lubrication data on plant equipment is placed on these lubrication record cards. Each card gives machine location, lubrication instructions, etc. Supplemental and safety instructions are typed in red; service data in black

Here's an Easy-to-Operate Lube Record System

It Takes Only 20 Minutes to Schedule the Next Day's Work

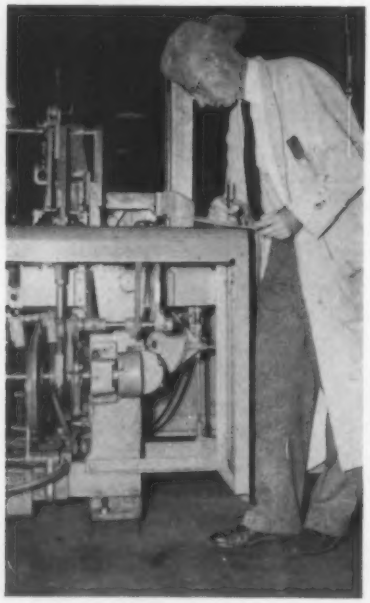


Fig. 2. Lubrication supervisor surveys accumulator. Facts are shown in Fig. 1

By H. W. CHANDLER, Manager of Maintenance Shops, and N. L. STOCKING, Foreman, Lubrication Shop, Parke, Davis & Company, Detroit, Michigan

SOME FIVE years ago, it became apparent that the old hit or miss type of lubrication was resulting in costly break-downs. Our first effort at correcting this was to establish four oilers under a group leader from our preventive maintenance section. The results in improved operation and appearance were sufficiently good to justify further expansion. The force was increased to seven oilers under the supervision of the machine shop assistant foreman. With the assignment of a full-time supervisor, the program moved forward rapidly to the point where we now have 13 lubrication service men operating out of an independent lubrication shop.

So we could begin operating quickly, we established our original program based on the manufacturers' recommendations. These provided a quick, ready basis to start with. It was quite apparent, however, that many modifications in these recommendations were needed to give the most economical coverage.

Initially, each man was provided a loose leaf binder containing all units he was to lubricate. The frequency of lubrication for each unit was first established from the manufacturers' recommendations, and later modified by a survey of the condition and usage of the unit. The loose leaf binders soon became too bulky and "dog-eared" for practical use, and we found that the men were lubricating from memory and that units were being missed. Also, no

record of lubrication was being maintained.

An investigation of clerical card systems was made in an attempt to find something that would afford a method of scheduling and a record of performance. The McBee Keysort card system was the answer to our problems.

Card Record on 6000 Units

In the past three years, 6000 units of equipment have been recorded on these cards, Fig. 1. The key-sort principle eliminates the necessity of filing in any particular order since cards covering a particular area, week, day, month, building, machine, number, etc., can be sorted out in a matter of minutes. The entire work for 13 men each day can be sorted out of the approximately 6000 cards in 20 minutes. Space is provided for the lubrication service man to record each servicing. Cards that cover daily lubrication are used for three years and are then replaced with a new card. On units that require less frequent lubrication, the cards are left in service for longer periods.

The first step was to record on the card the information required to perform a satisfactory job of lubrication. This was done by surveying all the equipment in the plant. A duplicate of the card was made on paper stock, and the lubrication supervisor recorded the instructions for a unit on this work sheet. We found that the more explicit we were in our instructions, the better the job obtained. Any safety precautions were also included. The equipment survey proved to be beneficial in another way because it revealed many places on the equipment where no means of lubricating moving parts had been provided.

Fig. 3. Lubrication cards are sorted daily by the supervisor. It usually takes from 15 to 20 minutes to select the appropriate cards for the next day's work schedule

Whenever a new piece of equipment is received in the plant, an "Equipment Data Card" is prepared by the preventive maintenance department. This is a multiple copy form that lists the name, location, size, and other pertinent information about the equipment. A copy of the "Equipment Data Card" is forwarded to the lubrication foreman, together with any service or operation manuals. The receipt of this copy is his authorization to proceed with the lubrication survey.

The lubrication supervisor then

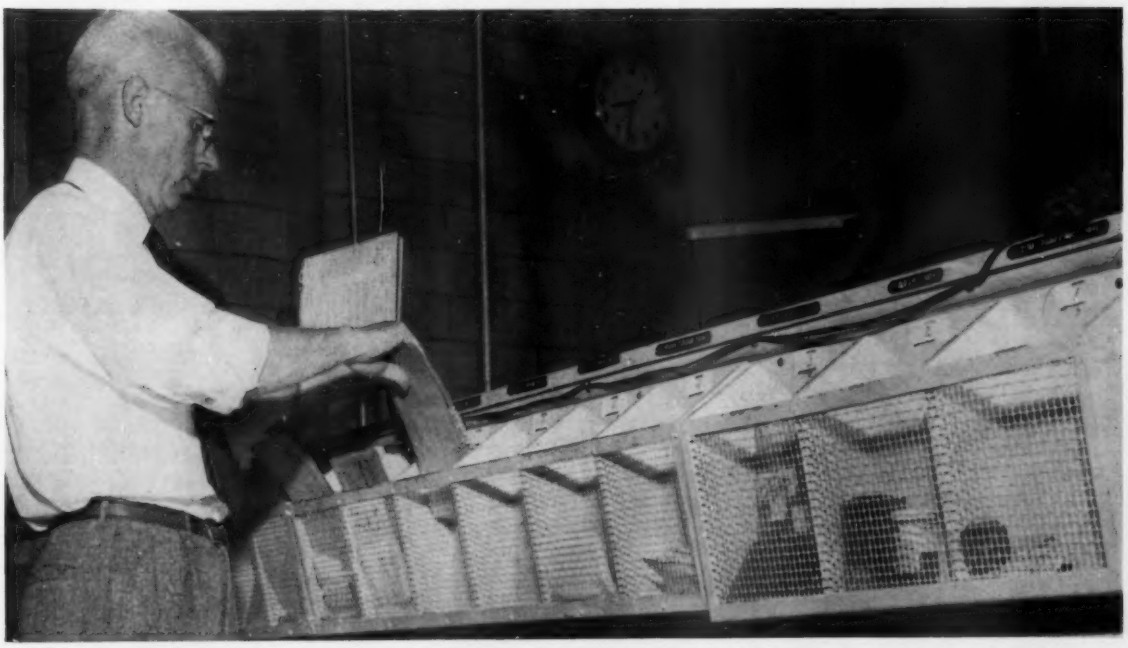


Fig. 4. After cards have been sorted, they are placed in the individual baskets of the 13 lubrication service men. By scanning the cards before he begins his tour the service man can tell if any special lubricants or equipment will be needed

Fig. 5. Service man checks lubrication card before servicing machine. Lubrication cart contains all the necessary lubricants he will need for the various machines

makes a physical survey of the equipment, and records the lubrication procedure to be used on the work sheet, Fig. 2. The service interval, the location and number of points of service, the lubricant to be used, and the route number are recorded. Any special instructions are also recorded.

The work sheet is then given to a clerk for typing on the "Lubrication Record" and key punching, Fig. 1. Supplemental and safety instructions are typed in red, and service instructions are typed in black. The cards are made up in duplicate. One is placed in a permanent file by machine number and the other is placed in the work file where it will automatically be sorted according to its lubrication schedule.

Here are several examples of the safety instructions which are typed in red: Be careful to get spider back on right and fasten good; Do not turn on at any time; Get section's or operator's okay first before servicing.

Some of the servicing instructions typed in black are: Remove cap top of agitator, grease thrust bearing; After oil is drained, turn over a few times to force out old oil; Front bearing on oscillator, very little lubrication.

From the time it was decided to utilize the sort card system, six months of prepartion was required to organize for their use. Based on prior knowledge of equipment location, the plant was divided into areas. In our case, ten areas were set up. The conversion from the loose-leaf binder to cards was accomplished by area to minimize confusion.

PARKE, DAVIS & COMPANY — INTER-OFFICE SPEED MEMO

TO	LOCATION	FROM	LOCATION
H. Dieter	Eng.	N. Stocking	Lub. Shop

SUBJECT: Lewis Shepard Pallet Truck — DATE: 10/11/56

MESSAGE:

Lewis Shepard Pallet Truck
Location - Bldg. 22
Serial # - 106-299
PD # - 12057

The small back-in wheel is missing on the end of the right hand fork.

Reported by W Gilgallon

PLEASE REPLY BY DATE 10/12/56 — SIGNED Norman Stocking

Fig. 6. This inter-office speed memo is prepared whenever the service man turns in a report on any of the equipment which requires repairs or parts replacement

How Cards Are Sorted

The cards are sorted daily by the supervisor, Fig. 3. This is usually done about 9:00 a.m. each morning for the following day. The cards for each truck are then placed in individual baskets, Fig. 4. The lubrication service men pick up the cards each morning. By scanning these cards, the men can tell if any special lubricants, or equipment will be needed and they can obtain them before proceeding to the job. Each evening, the lube service men return the cards to the lubrication shop where they are spot-checked by the supervisor, and returned to the file.

As an additional benefit, we have found that the service men utilize the fact that cards are turned in each day to pass information on to the supervisor. When repairs are needed on equipment, or changes in scheduling are needed, the lubrication serviceman attaches a note to the card when he turns it in. The supervisor then evaluates it, and if it applies to the lubrication operation, takes the necessary action. If the information is pertinent to another phase of maintenance, or to production, it is forwarded to the area engineer on a memo, Fig. 6.

After five years, we have a system which requires no elaborate filing and from which we can readily locate a card for any unit and obtain a complete lubrication history. The system permits the distribution of a controlled work load to every man in the shop every day with an expenditure of 15 to 20 minutes time. Cards can be added or subtracted any time without any change in procedure.

The training of a new man is greatly assisted by being able to give the man a card which explicitly covers each piece of equipment in his area. The card system also provides a means of covering critical units during vacations or absences, merely by checking the cards for the particular day or week the man is absent. **End**

Before and after views of million-gallon tank that was jacked up 25 ft to add new bottom panel. Original height was 100 ft

Million-Gallon Tank Jacked Up 25 Ft

INGENIOUS METHODS used by erection specialists at Chicago Bridge & Iron Company, "made a tall one out of a short one" for the Rocky Mount, N.C. water company. Without disassembling or moving it to a new location, a 416-ton, 25-year old radial cone elevated water tank was raised 25 ft.

Basic procedure for jacking up the million-gallon tank, which measured 88 ft across, was: 1. to erect close-fitting columns of box construction around the outside bottom columns of the original structure; 2. to gradually inch the tank and its supporting structure upward, using the new columns as sleeves; and 3. to install a new 25-ft bottom panel by the addition of struts and diagonals to the new columns.

First, an angle ring was fastened to the central riser about 25 ft above the foundation, temporary cables were run between this ring and the top of the outside columns (to support the riser and the central portion of the tank bottom) and the riser cut a short distance above its foundation. Thus it was not necessary to disturb connections, fittings, clean-out valve or manhole in the bottom section of the riser.

Next, each of the inside circle of columns was disconnected at the top of the first panel, leaving the bottom sections standing on their foundations and all of the upper inside panels hanging free. Then each outer column in the circle was cut loose from its base plate—one at a time — diagonals removed from it, and the new box column constructed around it. New bottom-panel struts and diagonals were installed as the cutting proceeded. At the same time lateral bracing was connected between the tops of the new sleeves and the inside columns.

The tower was, thus, kept at maximum rigidity to resist wind forces at all times.

When the complete ring of new bottom outer panels was finished, a scaffold was constructed about 22 feet above the foundation and twelve 75-ton manually-operated jacks positioned to seat atop each new outer column. The jacks acted upon lugs welded between the flanges of the original bottom panel columns. These lugs were moved and re-welded each time a jack approached the limit of its extension.

A height indicating gage, was provided at each jack to enable operators to keep the structure precisely level and the weight evenly distributed at all times.

Twelve men operated the jacks in unison, each operator making a stroke in time with sound signals given by a supervisor. Approximately 19,500 strokes on each of the 12 jacks were necessary to raise the tank and tower the required 25 ft.

When about one-third of the lift had been accomplished, temporary struts and diagonal rods were attached to the original outside columns. When two-thirds of the job was complete another such set of temporary struts and rods was installed.

The tank was raised 2 in. higher than the required 25 ft at the end of the job in order to permit insertion of new columns in the inside second panel. Thereafter the structure was lowered 2 in. to final location and the original outer bottom columns welded to the tops of the new outer bottom columns. All temporary struts and rods were then removed and replaced by the final diagonals.

The special procedures and equipment were developed by Frank Wurst of CB&I's General Erection department. **End**

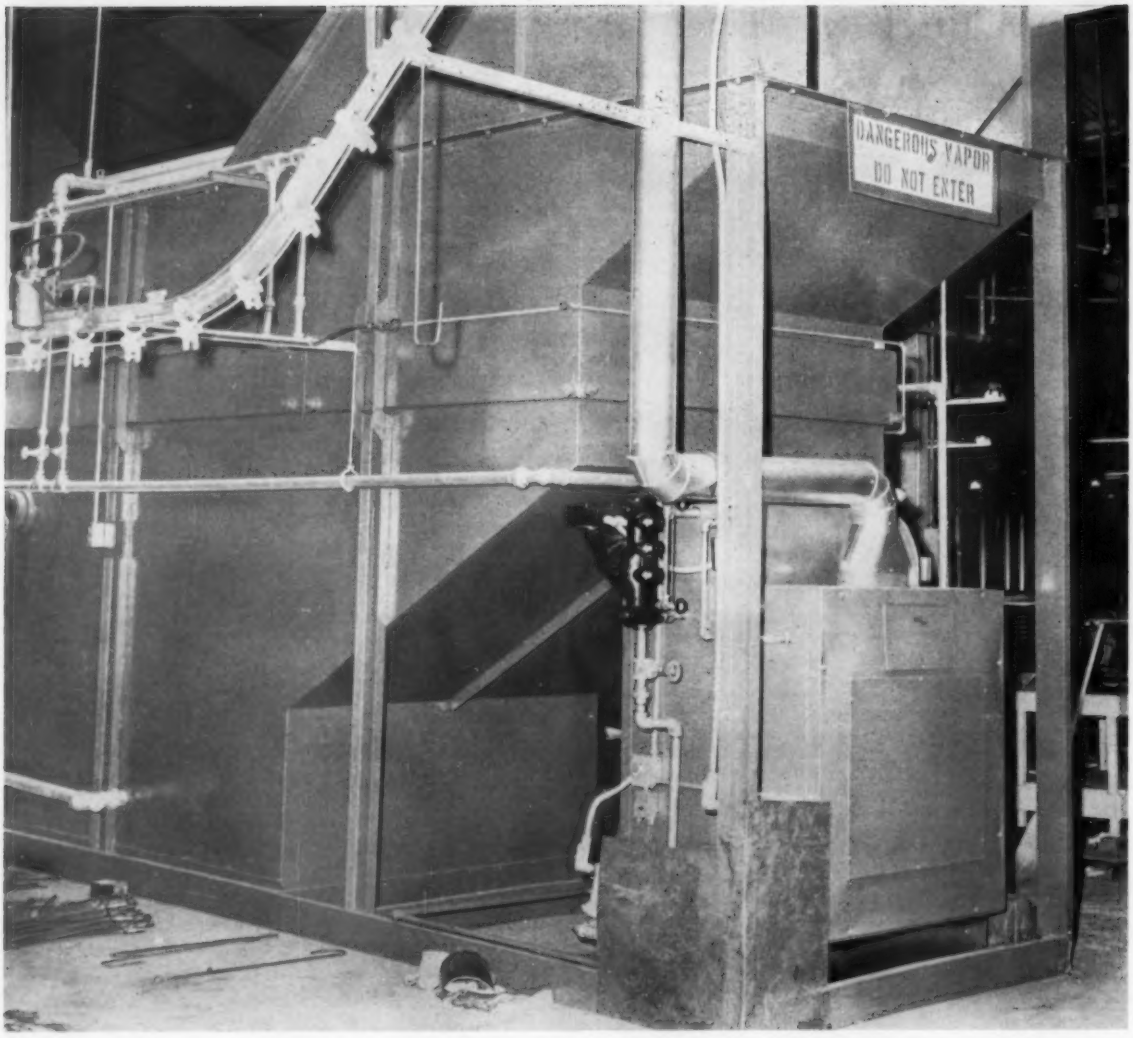


Fig. 1. This is boiler with closed hot water circulation used to heat a degreaser solution. Note small space requirements and fact that the boiler occupies what would otherwise have been wasted space. Unit is equipped with automatic controls

Odd Jobs for Small Boilers

On-Spot Heating—Steam or Water

By H. HELBOCK, Manager, Boiler Division, Pastushin Industries, Inc.

WE AT PASTUSHIN Industries, Inc., Los Angeles, recently received a contract to produce thousands of 9½-ft-long practice bombs for military use. Production of these practice bombs required installation of a large, automatic degreaser. This, in turn, called for the use of a boiler to heat the degreaser solution. Inasmuch as we had recently perfected and put into operation a small, high-efficiency boiler we decided to try it in this particular spot.

A short while later, a salesman for the company that manufactures the degreaser visited the plant. When he saw the boiler nestled under one end of the big degreaser, his question was typical: "What's in that square box?" A brief explanation and demonstration made from this man an ardent supporter of steam boiler installations for heating the solution in a large degreaser.

For other plant engineers who may be interested in this particular installation, the boiler is our Hercules Model LW-6. It is a 20 hp, gas-fired unit, equipped with fully automatic controls. In this case, steam is not used as the heating medium. Rather, hot water in a closed system and under boiler pressure is circulated through the pipes leading into the degreaser.

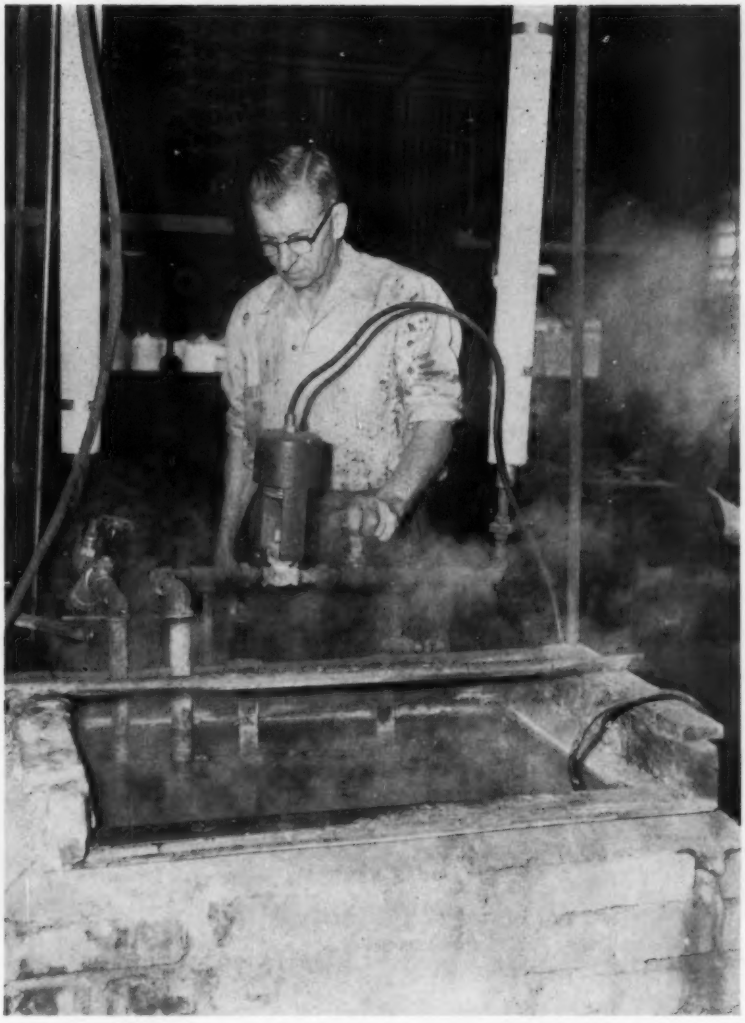


Fig. 2. Another installation heats this plating shop solution tank with steam, thermostatically controlled. Exhaust steam is used to heat hot water rinse tank

In this particular installation, the use of a closed hot water system has several advantages. No insulation need be used on the relatively short length of pipe employed, yet there is only a 30 F difference in the water leaving the boiler and return water after it has circulated through the degreaser. Because the system is closed, there is no chance for evaporation, and the water level in the boiler remains constant. After several weeks of operation, the water level in the boiler used on the degreaser has not changed, and no additions have been made.

A third advantage in boiler life and efficiency derives from the use of this closed hot water system that does not require new makeup water. After the water has circulated through the system a few times, it becomes completely demineralized and is, in effect, distilled water. This eliminates interior corrosion of all water-contact surfaces. It also eliminates interior scaling, and thermal efficiency of the boiler remains at its peak.

For plant engineers who are not intimately acquainted with these new-type, high efficiency steam boilers, a brief run-down on the design may be of interest. The packaged design of this boiler permits it to be installed in comparatively limited floor space. Isolation during installation is not necessary as the boiler body remains hand-cool during operation.

As shown in Fig. 3, vertical bent tube construction is employed. These tubes are accessible for inspection by simply removing a boiler body side panel. Any one of the tubes can be easily replaced without removing any of the others. Threaded plugs in the header directly opposite each tube opening permits easy tube cleaning.

Another feature of the boiler is the three-pass baffle system. This means that the hot gases from the burner must pass around the tubes three times before they are ejected into the stack. As a result of this arrangement, thermal efficiency of the boiler is about 80 per cent.

How Sediment Is Trapped

To maintain this high thermal efficiency, the boiler is designed so that all sediment is effectively trapped from the water before it circulates through the system, thus preventing the formation of interior scale and a resultant reduction of thermal efficiency.

Cool water enters the steam drum first, and because of its density, sinks to the bottom then flows through the shorter tubes into the upper portion of the header. While in the header, gravity causes quick precipitation of the solids in the water into the mud drum at the bottom of the header. By the time this more dense cool water sinks to the bottom of the header and starts circulating through the longer hot tubes, most of the solids have been precipitated out.

(Continued on page 264)

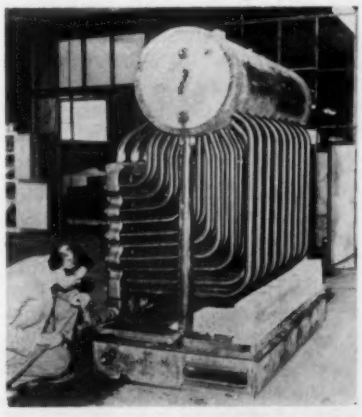


Fig. 3. Mud trap is blown down by opening the valve shown here. All sediment is ejected by boiler pressure

Fig. 1. Peeling paints offered little protection to wooden plank ceiling in galvanizing department of Keystone Steel

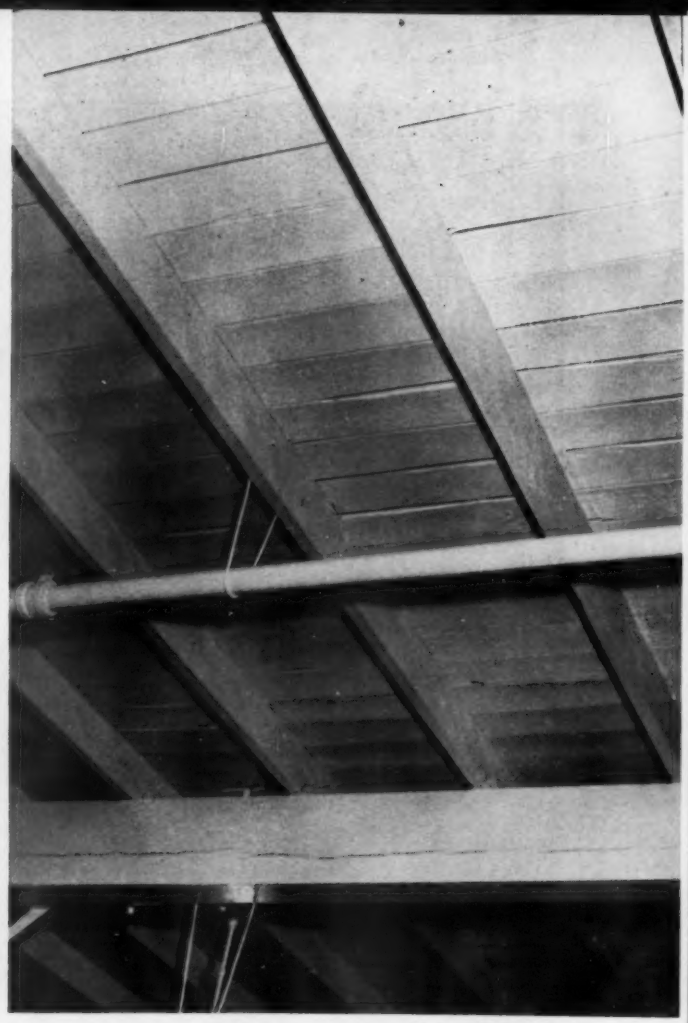


Fig. 2. One year after the epoxy based coatings had been applied to ceiling of the department they still looked good

Epoxies Get the Acid Fumes Test

Steel Company Cuts Maintenance Painting Time, Corrosion Loss

By RALPH McCABE, Maintenance Foreman, Keystone Steel & Wire Co.

EPOXY MAINTENANCE finishes, applied over steel and wood in our plant more than two years ago, have withstood daily corrosive attack by strong acid fumes better than any other coatings previously used. Following extensive testing in all building areas critically affected by corrosion, these epoxy finishes now represent a major part of our overall maintenance coating program.

At Peoria, Keystone manufactures a wide range of products from wire rod produced in its own rolling mills — fencing, barbed wire, nails, wire mesh and scores of similar items. All rods and wire are cleaned, pickled and etched in vats of heated sulphuric or muriatic acids. In the past, fumes arising from these processes eroded not only parts of the processing equipment, but also steel and wooden building structural members. Since the plant operates 24 hr a day, six days a week, the need for material replacement and repainting was a continuous drain on maintenance resources. None of the conventional coating materials lasted more than a few months.

For example, in the old cleaning house, coils of steel wire rods for drawing are pickled in eight large vats filled with a solution of hot sulphuric acid and sulphur trioxide. In the winter particularly, the acid fumes are intense. The 65 ft by 120 ft roof of this building consists of wooden planks 2 in. thick, which had been coated with an assortment of paints in an attempt to protect the wood against attack by the acid fumes. It was necessary to apply these paints at regular intervals because they inevitably peeled off in large chunks. In time the wood underneath rotted so badly that it was no longer safe to walk upon. About two years ago, one entire half of the roof had to be torn down

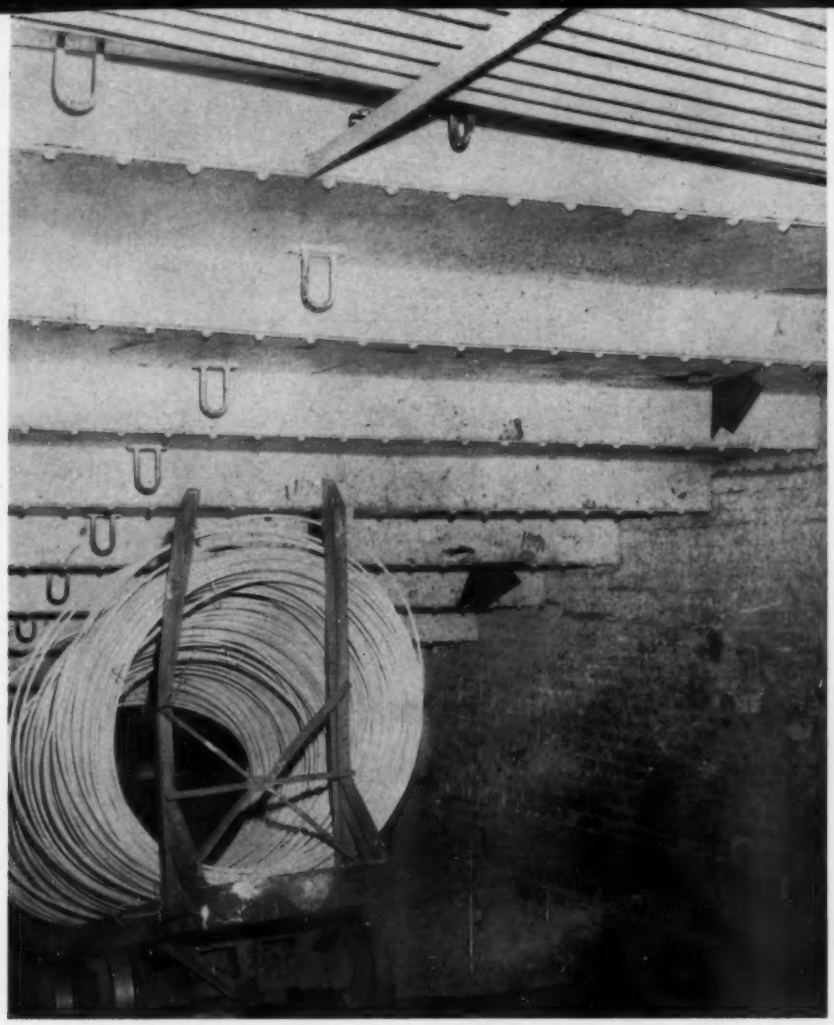


Fig. 3. In this subterranean tunnel, coils of wire travel from rod mill to cleaning department. Arrows show holes corroded through steel before epoxy was applied

and was replaced with new wood.

After the new roof section had been installed, the interior surface was sprayed just once with the epoxy resin-based coating. Applied over 24 months ago, this protective coating has been completely unaffected. We are planning to rip out the remaining half of the roof, replace it with new planks and coat it with the epoxy.

The effectiveness of these coatings was a guide to later maintenance practice. About a year ago, the construction of an additional cleaning house was completed. In this phase of manufacture, coils of wire are cleaned in hot sulphuric acid baths prior to wire drawing. All of the structural steel in this building has been coated with the epoxy finishes —the crane, crane runways, transformers, heaters and ventilators. The protection afforded to the metal by the epoxy finishes is in marked contrast to the ordinary enamels which had been applied to the steel components in the older cleaning houses. In most cases, the steel there has rusted out to a point where it is paper thin.

And Colors, Too!

By specifying pigmented epoxy coatings, we have been able to undertake a program of color dynamics in the new cleaning house. Apart from brightening the area, the varied colors are ready identification mediums — electrical equipment is blue, heaters and building steel are gray, the crane and runways are yellow, and equipment that could possibly injure or electrocute is orange.

Recently concluded was the entire repainting of our galvanizing department which measures 160 ft by 190 ft with walls 25 ft high. In this section, high and low carbon wire are run through lead pans for necessary tensile strength. They are then brought into pass furnaces and finally are cleaned in solutions of 15 per cent muriatic acid and 160 F water. Despite the high-powered exhaust impellers over each galvanizing vat, a sizeable amount of acid fumes spread over the ceiling.

The old paint was totally ineffective. Where it had cracked and peeled, the wood beneath was in many cases severely rotted out. Prior to repainting, all wood and steel surfaces were scraped clean, and structural sections repaired as required. The light green epoxy coating was prepared and then sprayed on. That was all. No primer was required, and the single surface coat should provide protection against acidic corrosion for at least five years.

The special coating formulations are supplied by Hauger-Beegle Associates, Inc., Chicago, and are based on Epon resin 1001. These finishes have excellent adhesion, plus the high abrasion and impact resistance necessary for our applications.

The finishes are two-component systems, requiring the mixing of pigmented epoxy resin solutions either two to one or one to one with a catalyst. Working life of the mixture is limited to about eight hours for best results when applied by brush, but this time can be extended somewhat by spray application.

Although the coating dries hard within 24 hr at room temperature, it takes about five days at room temperature before the cure becomes complete. We have found that the coatings can be sprayed over slightly damp surfaces and even in the presence of acid fumes. As a result, repainting can be accomplished without disrupting production.

Because of the high solids content of these finishes, a thick coating can be obtained in a single coat application. Since these epoxy resin finishes cure by chemical reaction of the epoxy resin and curing agent, thorough cure is obtained in heavy films without wrinkling.

Another area where these maintenance finishes have proved superior is in the subterranean tunnel where coils of wire rods ride upward from the rod mill to the cleaning department. The pipes and ceiling in the tunnel formerly had been covered

Fig. 4. This is a particularly bad spot in the plant—directly over the exhaust hood of the acid pickling vats. Note how acid fumes attack wood, steel and paints

Fig. 5. Note the neat, well-maintained appearance of this portion of the plant. Structural steel in cleaning house was coated with pigmented epoxies a year ago

with a slack lime. In a short time, however, the lime peeled off and the piping rusted at an alarming rate. A single coat of the finish, applied about two years ago over the lime and without any preparation, has effectively stopped corrosion of the metal.

We have also reduced a major maintenance expense by coating exhaust impeller blades with the epoxy finishes. Formerly they had to be replaced about every three months

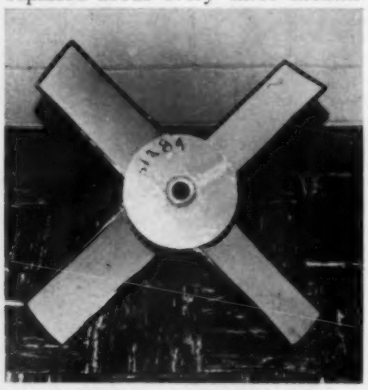


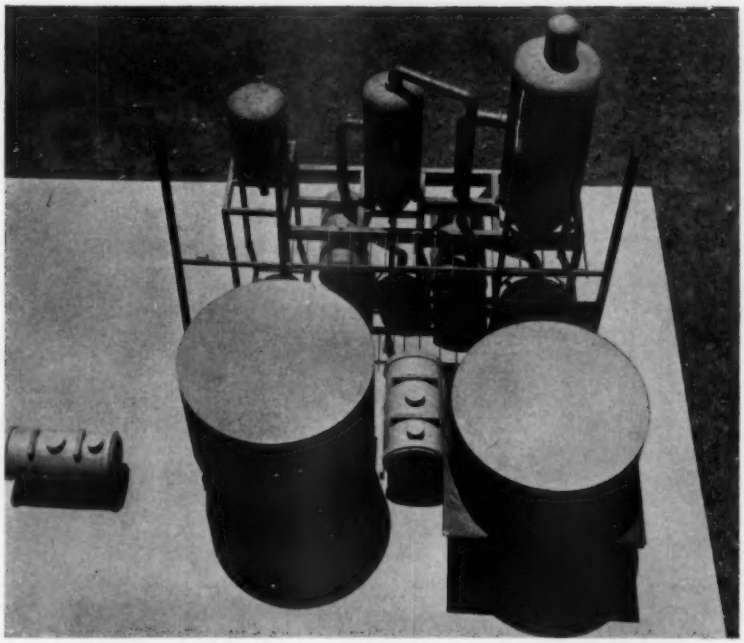
Fig. 6. Mild steel impeller blades laminated with epoxy finishes and mat are practically immune to acid attack

at a cost of $120 each. These 20 in. steel fans are located in the galvanizing department over each acid vat hood, and operate continuously at 1750 rpm. Their function is to exhaust the fumes through a duct that leads to outer air. As a result, they are subjected to the greatest corrosive attack by the hot muriatic acid fumes.

Stainless steel blades were pitted badly and actually had worn through in spots so that the impeller was thrown off balance. A plastic coating was tested over the stainless steel, but this coating failed in less than three months, and by that time the steel blades had to be replaced.

Now mild steel impeller blades are sprayed with the epoxy finish and covered with fiber glass mat. The mat is thoroughly impregnated with another spray coating, and a second layer of fiber glass is applied, followed by a final spray coating. These epoxy laminate-coated blades have been in service for over 18 months without causing any corrosion problem.

In the past few years, the use of epoxy maintenance finishes has substantially reduced our costs for labor and materials. **End**



Use of this scale model helped cut the originally estimated time by two-thirds and the cost of replacing the two condensers by 50 per cent. In addition, it provided the maintenance department with a visual check on all phases of the move from the supplier to the site

Making a Change? Check Scale Model First

By J. J. SEIDEL, Maintenance Supervisor, Monsanto Chemical Company

IF SAVINGS can be realized using scale models on new plant installations, why can't the same ideas be applied to unusual repairs, replacement, or alterations to existing facilities? We found the answer when we had to replace two condensers at the plant.

The condensers were 6 ft and 8 ft 6 in. in diameter by 14 ft long; they weighed 32 and 42 tons respectively. To further complicate the problem, the existing units were suspended from the steel structure of the second level of the building. Working space was at a premium, and it was necessary to keep production downtime at a minimum.

Any number of handling methods were discussed, but the best two appeared to be: (1) laying a temporary railroad track and physically moving the units on a set of four railroad car wheels, or (2) moving the units on a low-bed heavy duty float.

During the hatching of the ideas, an offhand remark, "Why don't you have a scale model built?" was made. This remark really paid off. We cut our originally estimated time by two-thirds and the costs by 50 per cent. Here is how we did it.

We had a scale model built from available drawings and then took it out into the field and checked it for accuracy. With the use of the model, we eliminated the railroad track idea and decided on moving the units with the low-bed float.

How the Model Helped

The model also brought to light our rigging problem in lifting the units. Checking into this, we discovered our suppliers planned to ship the units upside down, using the saddles the units hung from to anchor them to the railroad car. With our model as a guide, we designed temporary steel saddles on which the condensers could be shipped and handled in an upright position.

We ended up using the model for two more purposes. One, we explained the job with the foreman involved, actually removing and replacing pieces, step by step, as per written instructions. This showed the foreman why each phase had to follow in the steps as outlined, why equipment that was to be replaced had to be stored at a specific spot, and where and why his cranes, air compressor, etc., were spotted at specific positions.

Our second use of the model was as a gift and thanks to the rigger shop steward for display in his shop area, so that his crews would remember the excellent job turned in by them on this project.

No, we did not turn in an errorless project. We discovered a few items that will be checked closer the next time. What were the errors? We will be sure to make a physical check, as to size, on all major pieces of equipment we rent. We found our equipment rental supplier was off 18 in. on the height of his low-bed float. Also, we found you had best allow one foot minimum for clearance. When using our scale model, we allowed 6 in. after our field check but lost it in our model accuracy some place.

In general, we feel we got a useful tool in a lot of ways from our scale model; and we will be sure to use a scale model for our next unusual maintenance job. **End**

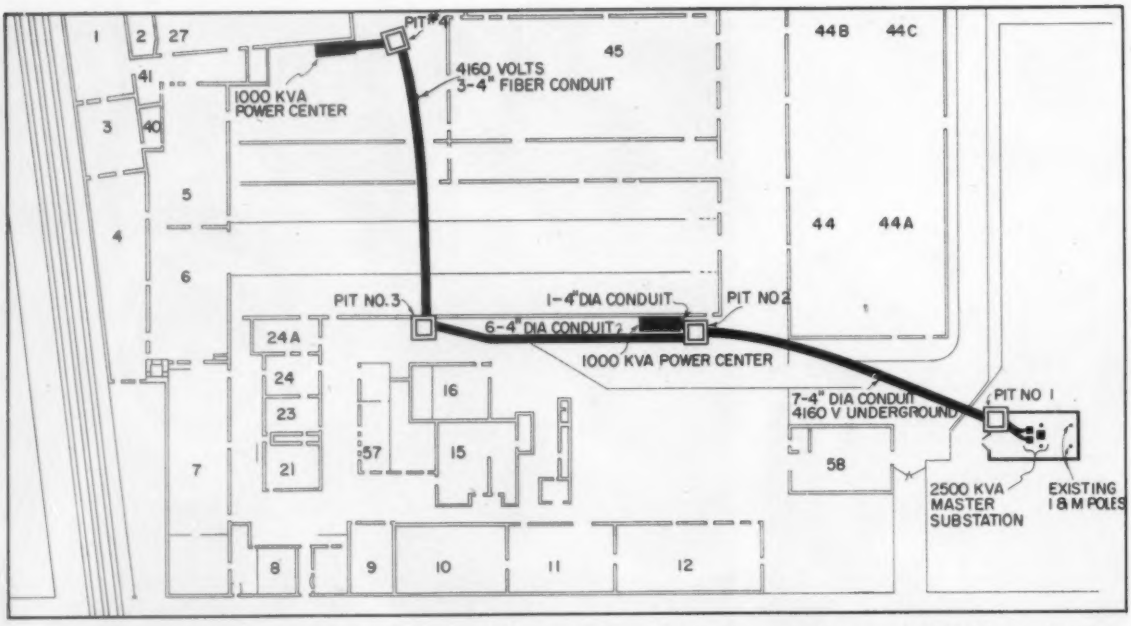


Fig. 1. Incoming 33 kv line serves old power center and new 4160 v system. Cable runs underground to 1000 kva substations

Need More Electrical Capacity?

Higher Voltages Keep Ahead of Increasing Demands

By J. PAUL JORDAN, Director of Engineering, Dodge Manufacturing Corp., Mishawaka, Indiana

J. Paul Jordan attended Purdue University School of Mechanical Engineering where he received his B.S. degree in 1931. He started at Dodge Manufacturing Corp. in 1935 and served in the engineering department until he was promoted to Plant Engineer in 1943. As Plant Engineer he has been responsible for the company's buildings, equipment, mechanization and expansion programs. Mr. Jordan was recently appointed to the position of Director of Engineering and will direct all engineering and development work at Dodge Manufacturing Corp.

ELECTRICAL DEMAND has increased in our plant over the past few years and has resulted in adding additional transformer and distribution capacity. This higher demand has been brought about by plant additions, new machinery and by changing to larger motors on older equipment.

Our prime problem was to add new equipment and a modern distribution system as a supplement to our existing system. We want to continue to use the old system, with modification, until it is no longer dependable.

In the original distribution system, Fig. 2, the 33 kv primary power line feeds one bank of three 500 kva single phase and one 1000 kva, 3 phase transformers.

A 480 v secondary is fed through two separate low impedance bus ducts to our distribution switch gear, Fig. 3. Fortunately, a large portion of our load is in the main machine shop, located within 300 ft of this switch gear. We intend to continue feeding this area from our existing transformer substation.

We have installed a new master substation, Fig. 4, under our 33 kv power line adjacent to the Indiana & Michigan Electric Company's meter. This consists of a wooden "H" frame structure with lightning arrestors, load interrupter switch, gang operated from the ground, and SM-5 fuses. This structure is so arranged that it can be converted at a later date to a double-ended arrangement when additional units are required.

The 33 kv is fed into the primary of a 2500 kva, oil filled, self cooled transformer with a delta primary and a grounded wye secondary having an initial distribution voltage of 4160 v. It was necessary to fence off this area as a certain amount of bare bus is required on the 33 kv side of the transformer.

We installed outdoor type oil circuit breakers, mounted on angle iron frames, as this proved to be less expensive than the throat-connected air circuit breaker arrangement. These breakers are solenoid

operated and a transformer and selenium rectifier is provided for their operation.

A steel structure and bus distributes power to the two oil circuit breakers and future provisions have been made to add to the ends of this structure to accommodate two more breakers.

The power is fed from the oil circuit breakers to pot heads and then to four-inch underground fiber ducts which converge in a pit located in the transformer yard. This concrete pit has windows or openings on all four sides that go almost all the way through the walls. These windows can easily be knocked out, if we should want to distribute power in another direction. Parallel runs of conduit have been installed adjacent to the presently used ducts for future use.

Underground Duct

In laying our four-inch fiber conduit, we first poured a four-inch slab of concrete in the trench with wires embedded in the cement but extending out so that the conduit could be secured. After the conduit was laid and secured, it was covered with another four inches of concrete. This top layer of concrete is two feet below grade. Pits similar to the one in the transformer yard are spaced at 300 ft maximum distance along the route of the conduit, to facilitate pulling cable.

Three, 5000 v, Neoprene-covered, 1/0 cables, with corona shielding, were pulled through the conduit for each unit substation. All runs of the 4160 v feeder lines are underground, and are in yard areas except one run which goes through the machine shop.

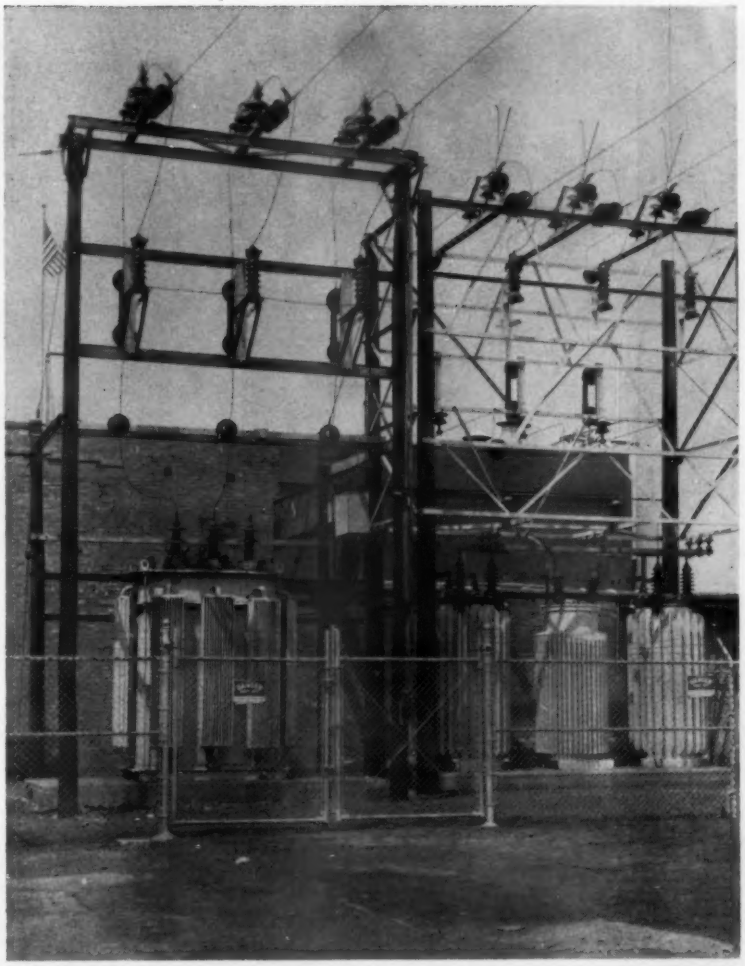


Fig. 2. Original transformer bank, 33 kv primary, 480 v secondary. Low impedance bus feeds power 200 ft to distribution switchgear in power plant shown in Fig. 3

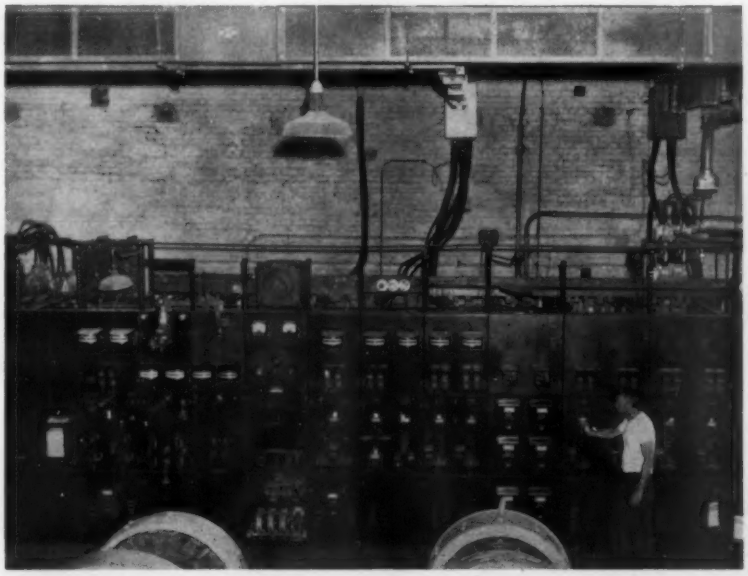


Fig. 3. Cables tie bus runs to 480 v switchboard in power plant. David Gregg, Engineer, operates breaker to check location of ground indicated on ground detector.

We have recently installed two 1000 kva load center unit substations, Fig. 5. One unit substation is located about 300 ft and the other approximately 1000 ft from the master substation. These units consist of a 4160 v delta primary and a 480 v wye undergrounded secondary. Each 1000 kva oil-filled transformer is throat-connected to outdoor type switch gear consisting of six, 600, amp air circuit breakers with an interrupting capacity of 35,000 amps. The 480 v lines are fed through a tunnel to the interior of our buildings. We use 350 MCM cable in duplex on a flattened ex-

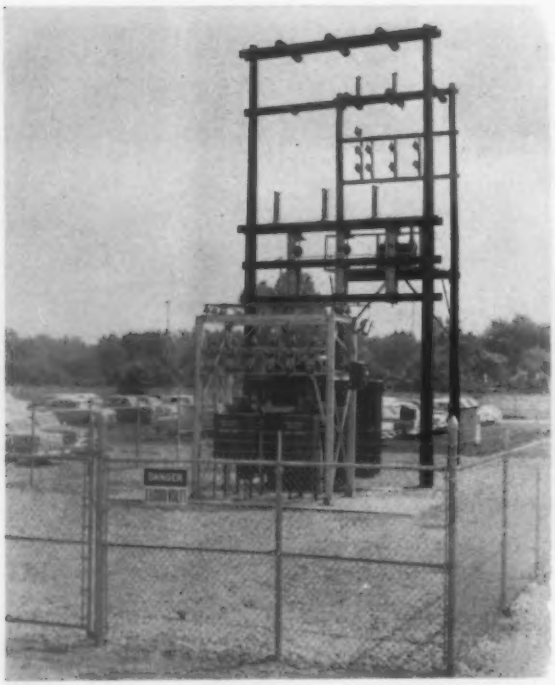


Fig. 4. New 2500 kva substation 33 kv delta primary 4160 v grounded wye secondary. Two 4160 v line breakers in front

Fig. 5. Oliver Keck, Maintenance Foreman, inspects a 480 v draw-out breaker on 1000 kva unit substation outside of shop

panded metal tray through the tunnels.

Inside the buildings, it is fed up through rigid conduit and distributed to various departments. In the foundry, the power is fed to dust-tight control centers. In machining departments, it is fed through conduit to 600 amp plug-in type bus duct, Fig. 6.

We felt that main breakers were not required in our unit substations due to the lower interrupting capacity of the two step transformer arrangement. The 4160 v lines are fed through rigid conduit from an adjacent pit to an oil switch mounted on and throat-connected to the 1000 kva transformers. This oil switch will only interrupt the magnetizing current of the transformer.

The metering section in our switch gear was omitted; however, provisions have been made for plug-in recording meters. This was an economy measure as we felt that meters would not be used very often due to the unit substations being located remotely from our engine room. Perhaps it should again be stressed that these unit substations service our more outlying buildings and our old system is still feeding power to our more centrally located departments.

In the very near future, we are going to install a 900 kvar capacitor bank on our 4160 v distribution system. These capacitors will be clock-operated to increase our power factor to near unity at peak demand and to reduce our demand billing. Our figures indicate that the cost of this equipment will be amortized within three years.

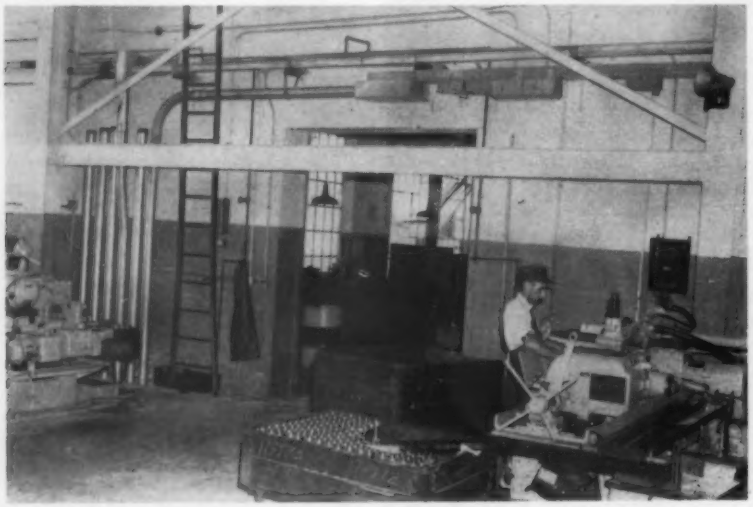


Fig. 6. Four-inch conduit (left) carries circuits from breakers, through trench to bus duct runs in shop. Each conduit carries two 350 mcm cables per phase

Future Improvements

We also have on order, new indoor-type switch gear to replace the obsolete oil circuit breakers, Fig. 7, presently located in our engine room. While these oil circuit breakers had sufficient interrupting capacity when installed, higher capacity breakers are now required due to the great increase of the available energy that could be transmitted over the 33 kv line from the

power company under short circuit conditions.

These are to be indoor-type air circuit breakers mounted in double-ended cabinets. We will feed the 2000 amp low impedance bus duct into one end and the 1350 amp bus duct into the opposite end. Each of these 480 v, 3 phase bus ducts will feed through a 1600 amp main circuit breaker and then through a set of six, 600 amp, distribution breakers with a cubicle between the two for a 1600 amp tie breaker.

If we should desire to feed all of the distribution breakers from one bus, it will be necessary to withdraw the 1600 amp main from the side that is disconnected and insert that in the cubicle allotted to serve as a tie breaker. This will not only save the cost of the tie breaker, but will be an obvious safety precaution.

This new switch gear will replace all of our panels shown in Fig. 3 except two sections which are used on our motor generator sets. The transformers that feed this equipment are 33 kv delta primary and 480 v ungrounded delta secondary.

On all new equipment, we have gone to 4160 v delta primary and 480 v wye secondary. One reason for selecting this type of transformer was the possibility that we might someday change over to a grounded system and use the phase-to-ground voltage of 277 v for fluorescent lighting. This would complete the transition to high voltage operation in our plant. **End**

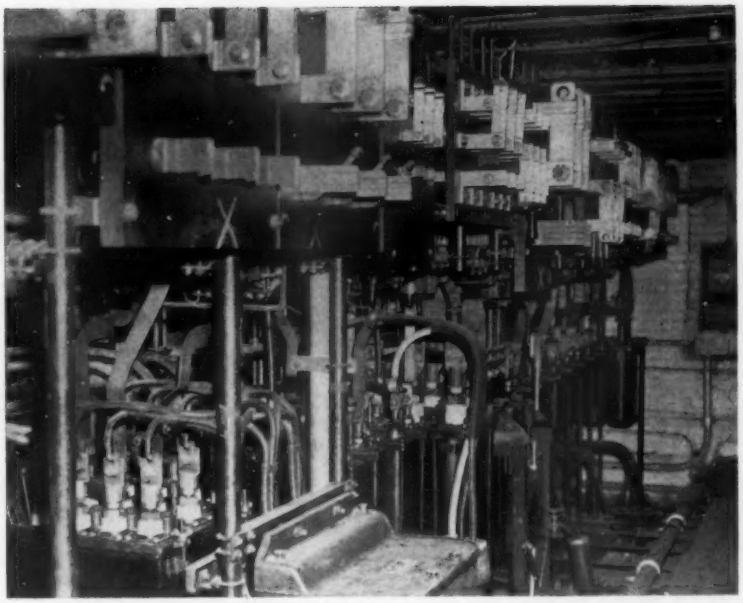


Fig. 7. Higher demands and increasing transformer capacity have created dangerous interrupting capacity on oil circuit breakers behind main switchboard

Fig. 8. Final utilization of power in steel machining area. Bus duct, on far wall, feeds machines and lighting transformers. Continuous rows of two lamp, 96 in. T-12, high output, 800 ma, fluorescent fixtures on 25-ft centers provide excellent lighting

NPSH and Pump Selection

Chart and Calculations Help Check Unit Adequacy

By WILLIAM R. CALL, Allis-Chalmers Mfg. Co.

WHEN TEMPERATURE, density and vapor pressure must be considered in pump problems, it is necessary to calculate the net positive suction head (NPSH) on the pump.* After calculating this factor, the question may be—"What do I have?" Your answer to the problem might seem confusing. To help keep the picture clear, one can plot a chart; see Fig. 1.

This chart has been evolved with the following considerations: At sea level the theoretical cold water suction lift equals 34 ft minus—NPSH. Suction head is interpreted as a negative suction lift.

Selection of a centrifugal pump is simplified through the use of such a chart. Two or three examples are presented to show the use of this chart. In Example 1, NPSH equals 20.24 ft or an equivalent cold water lift of 13.76 ft. The chart indicates that the suction lift of 13.76 is within the operating range of a normal type centrifugal pump.

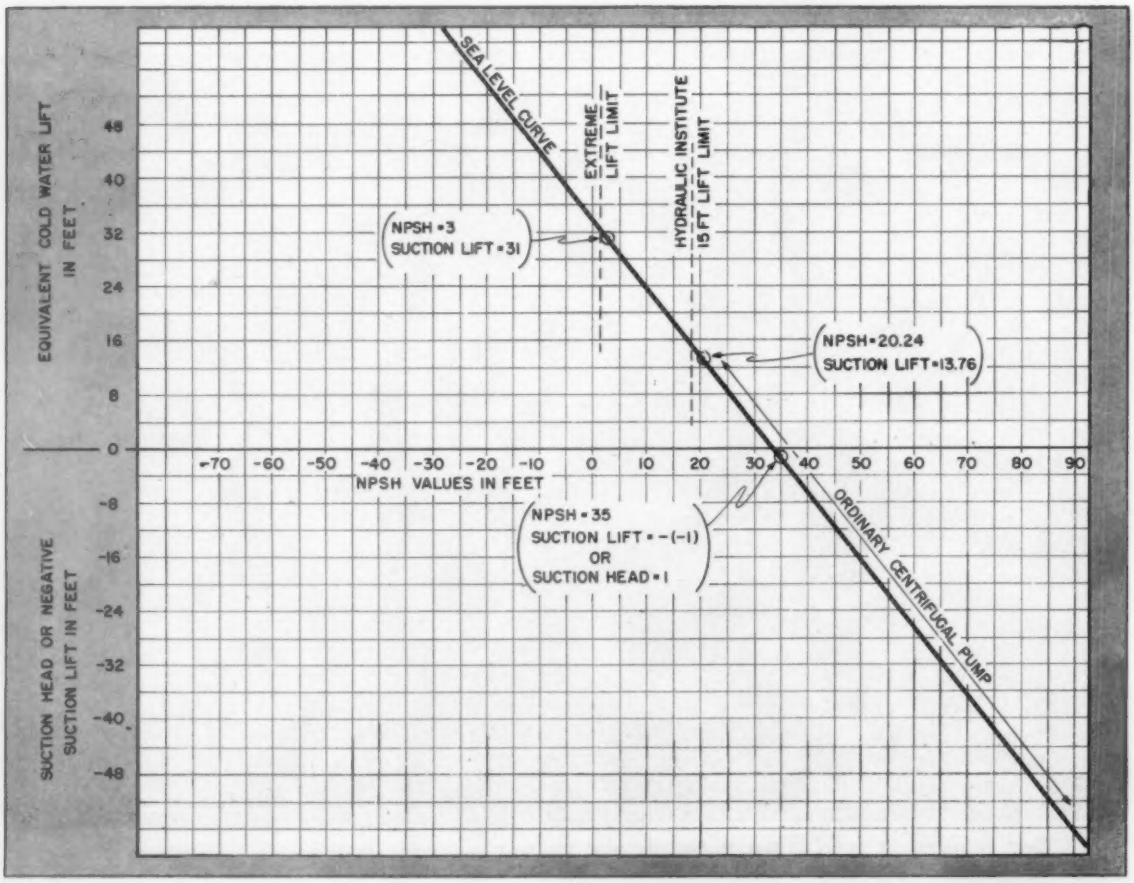
The NPSH in Example 2 is 35 ft; the equivalent cold water lift is minus one foot. Again, with the aid of the chart the selection of a pump is not difficult. Requirements fall within the pump range.

In example 3, there is a NPSH factor of three feet or an equivalent cold water lift of 31 ft. The chart indicates that a condensate pump is required to meet head conditions.

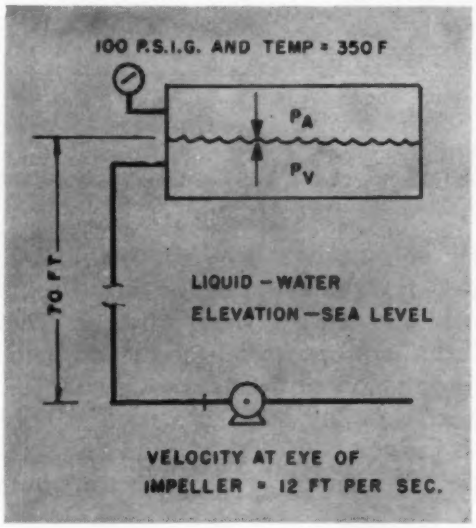
At elevations other than sea level, one can plot a family of curves or lines paralled to sea level line. **End**

*Additional information on NPSH is found in the Centrifugal Pump Section of the Hydraulic Institute Standards published by the Hydraulic Standards Institute, 122 East 42nd St., N.Y.

Fig. 1. Chart shows where NPSH-suction lift figures calculated in article examples have been plotted on the sea level curve



Calculations For Centrifugal Pump Selection



EXAMPLE NO. 1

$$NPSH = \frac{(P_a - P_v) \times 2.31}{\text{Specific Grav.}} \pm H_s + V^2/2g$$

P_a — Gage pressure + Atmospheric pressure

P_v — Absolute vapor pressure at a given temperature

2.31 — Constant for converting psia to ft

H_s — Suction head (+) or Suction lift (—)

$V^2/2g$ — Velocity head in feet
(Liquid—Water; Elev.—Sea Level; Vel. at impeller eye—12 fps)

$$NPSH = \frac{([100 + 14.7] - 134.6) \times 2.31}{0.888 \text{ (at 350 F)}} + 70.0 + 12^2/64.4$$

NPSH = +20.24 Ft

Equivalent cold water lift = 34 — (+20.24) = 13.76 Ft

EXAMPLE NO. 2

$$NPSH = \frac{(P_a - P_v)}{\text{sp gr}} \times 2.31 + H_s - H_f + V^2/2g$$

P_a = 14.7 + 5 = 19.7 psia

P_v = 19.7 psia

H_s = 37.0 Ft

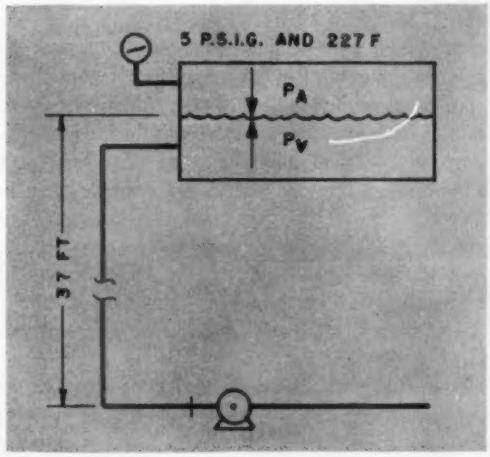
H_f = 2.0 Ft (friction)

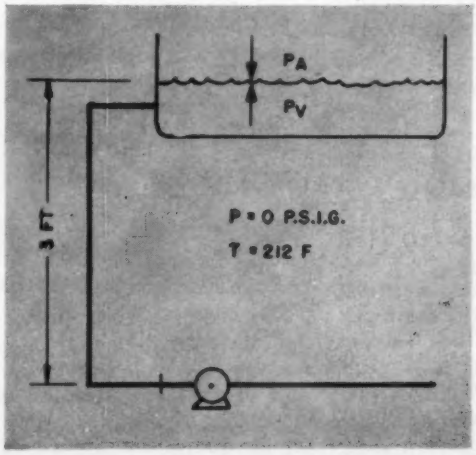
$V^2/2g$ = 0 (In this particular case)

$$NPSH = \frac{(19.7 - 19.7)}{0.955} \times 2.31 + 37 - 2$$

NPSH = 35 Ft

Equivalent cold water lift = 34-35 = — 1.0 Ft





EXAMPLE NO. 3

$$NPSH = \frac{(P_a - P_v)}{\text{sp gr}} \times 2.31 + H_s - H_f + V^2/2g$$

P_a = 14.7 psia

P_v = 14.7 psia

H_s = 3.0 Ft

H_f = Negligible

$V^2/2g$ = Negligible

$$NPSH = \frac{(14.7 - 14.7)}{\text{sp gr}} \times 2.31 + 3 - 0 + 0$$

NPSH = 3.0 Ft

Equivalent cold water lift = 34 — 3 = 31 Ft

Do Trolley Busways Pay Off?

Plant Engineering readers, based on the results of this survey, say they do.... Over 80 per cent claimed reduced maintenance on trolley busways over previous systems. Many mentioned additional pay off on reduced operating costs, increased production and improved safety.... Among the unexpected replies were new uses, in lighting systems.... Here is the complete report, including some of the candid remarks taken directly from the questionnaires

By VERNON T. KEMPF, Electrical Editor, Plant Engineering

THERE ARE MANY POSSIBILITIES, in industrial plants, for the application of electrical feeders for powering moving machinery and equipment. Cranes and hoists, assembly lines and test lines require some method of feeding power to machines on the move. Enclosed trolley busways offer many advantages as power feeders although they may be higher in first cost.

PLANT ENGINEERING has just completed a survey among 2036 plant engineers to find out what they think about trolley busways and their uses. The questions were set up to provide a maximum amount of information to plant engineers who have not, as yet, used trolley busways in their plants.

Some of the questions they would want answered are: Has the use of the trolley busways reduced operating costs? Has it increased production? Has it reduced maintenance? What effect has trolley busway installation had on work accidents and safety of equipment and buildings? Has it reduced insurance rates? How is it used? What are the outstanding benefits of trolley busway installation?

Another item of interest to the prospective user would be the type of system replaced by the trolley busway. Conventional open trolley wires and angle bar conductor systems have been replaced with trolley busways in almost half of the plants surveyed. The reason in almost all cases was reduction in hazard to workmen. Looped cords and extensions were replaced to reduce the tripping hazard. There were many new uses of trolley busway reported, such as in lighting systems, and these may be of interest to present users as well as non-users of trolley busway.

The Questions, the Answers, and What They Mean

1 Question 1. Does your plant use a steel-enclosed trolley busway system?

A TOTAL OF 474 replies were received for a return of 23.3 per cent. A little more than half, 284 or 59.9 per cent replied that they do have trolley busways in use.

2 Question 2. If your trolley busway system replaced another system of electrical distribution, what did it replace?

THERE WERE 126 replies detailing systems formerly used. The balance of the replies were new systems. As most of the balance of the questions deal with the relative advantages of trolley busways compared to previous systems, we will analyze only the 126 replies indicating experience with other systems.

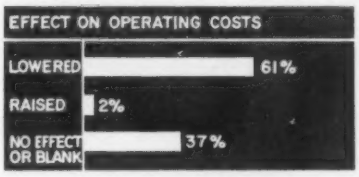
Of the systems replaced, open trolley wires and angle bar conductor systems for cranes and hoists led by a large margin. Of the 126 replies, 56 or 44.4 per cent fall into this group. Wall plugs and extension cords have been replaced with trolley busways in 37 or 29.4 per cent of the 126 applications.

Multi-conductor cable feeding hoists, cloth cutters and portable tools is the next largest use of busway with 33 replies and 26.2 per cent of the total.

3 Question 3. What effect have trolley busways had on operating costs?

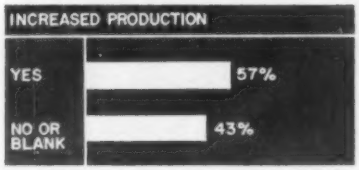
THE GENERAL CONCENSUS was that it lowered operating costs. At least 77 replies with 61 per cent of the total felt this way. Opposing this large majority 2 replies stated that it had raised operating costs. Both applications

were replacements for open crane wiring. About the only advantage either one could see in the enclosed trolley busway is the elimination of shock hazard. Of the total, 47 or 37 per cent felt that there had been no effect or left



the question blank. The plant engineer may or may not be keenly attuned to operating costs. Later on when we talk about maintenance costs we find a more positive opinion of the worth of trolley busways.

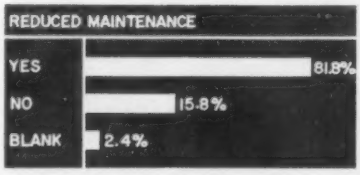
4 Question 4. Has use of trolley busways increased production?



WE FIND ABOUT THE SAME per cent breakdown as in the previous question. A total of 72 replies or 57 per cent stated that busways increased production and 54 answered "No" or left the question blank.

5 Question 5. Has it reduced maintenance?

NOW WE ARE ON FAMILIAR ground as 103 replies came out with a strong "Yes" for 81.8 per

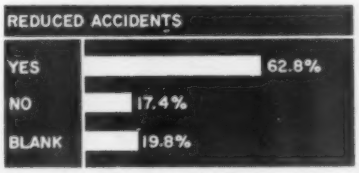


cent. Of the balance 20 or 15.8 per cent gave a definite "No" and only 3 replies came in blank.

As the large majority agree that it has reduced maintenance it follows that it must have reduced maintenance costs. This in turn must have had some effect on operating costs when we consider the maintenance budget as part of the operating department.

6 Question 6. Has it helped reduce the number of work accidents?

THE ORIGINAL TABULATION showed a definite "No" with 57 replies or 45.2 per cent. Of the balance 44 felt that it has helped to reduce accidents and 25 were blank. Somehow this did not seem right to us so we did a little more digging for facts. In Question 7 we asked if



the trolley busway had contributed to safety of equipment and buildings. We noticed many replies with a "Yes" answer stating reduction in shock hazard as the reason. Apparently this question was not too clear to many respondents as this should have resulted in a "Yes" answer to Question 6.

To prove this theory we rechecked all the replies and took out the questionnaires that had replied "No" to Question 6 and "Yes" to Question 7 with reduction of hazard to personnel as the reason. We found 35 replies fitting this category and if we include these in the "Yes" section of Question 6 we find a little different story that makes more sense to us.

Now we have 79 replies with 62.8 per cent agreeing that trolley busways reduce accidents. Quite a few, 25 replies, were not sure and left the question blank. Only 22 with 17.4 per cent came out with a definite "No" answer.

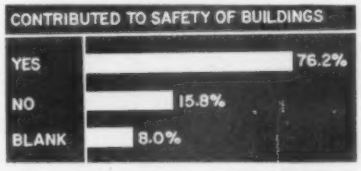
As part of Question 6 we asked those answering "Yes" to write in how trolley busways have helped to reduce accidents. There were 37 write-in replies with the majority mentioning the reduction in shock hazard. Typical answers were; "crane in low bay where operator can touch wires"; "less care when working close to open wires"; "no danger of accidental contact".

There were 10 replies commenting on the reduction in tripping hazards due to the elimination of cords. Some of the answers on tripping were; "the men do not have to stumble all over lines or work around extensions"; "no wires on floor"; "it has removed the tripping hazard of cords and plugs on the floor"; and "extension cords were removed from the floor thereby removing tripping hazards."

7 Question 7. Has it contributed to safety of equipment and buildings?

THE LARGE MAJORITY agreed that trolley busways have contributed to safety of equipment and buildings with 96 "Yes" answers or 76.2 per cent of the total. Of the balance 20 or 15.8 per cent said "No" and the rest were blank. As we mentioned in Question 6, apparently this question was misunderstood by a lot of the respondents. An examination of the reasons why they felt the trolley busway had contributed to safety of equipment and buildings found many that belonged in Question 6.

There were 67 write-in replies. Of this number 38 gave reasons of



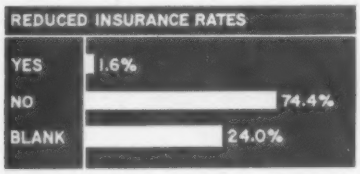
reduced shock and tripping hazard that are answers to Question 6. In the previous question we pointed out that 35 of these had answered Question 6 with a "No."

The balance of the replies showed a large group commenting on the ability to properly protect equipment through correct fusing. Typical replies were: "Elimination of short circuits and slight fires"; "All busways have proper fuses or breaker protection"; "By providing a quick and easy method of unit motor fusing and overload protection".

8 Question 8. Has it helped to reduce insurance rates?

THIS MUST HAVE BEEN a tough one for most of the respondents as 124 replies or 98 per cent came in with a flat "No" or left a blank. Of

this group 94 actually said "No" although I suspect that "I don't know" would have been more appropriate. There were two replies



that said that their insurance rates have been reduced although their answers to the question on the per cent of reduction indicated that they did not know the effects of the reduction.

If you, as plant engineer, made an installation that increased the insurance rates I am sure you would hear about it fast. It seems reasonable that you should also be informed of installations that reduce the rate. This would be a measure of how well you are planning the work and would also give you ammunition to justify some items that might be slightly higher in first cost but would pay off in the long run.

9 Question 9. How is the trolley busway system used in your plant?

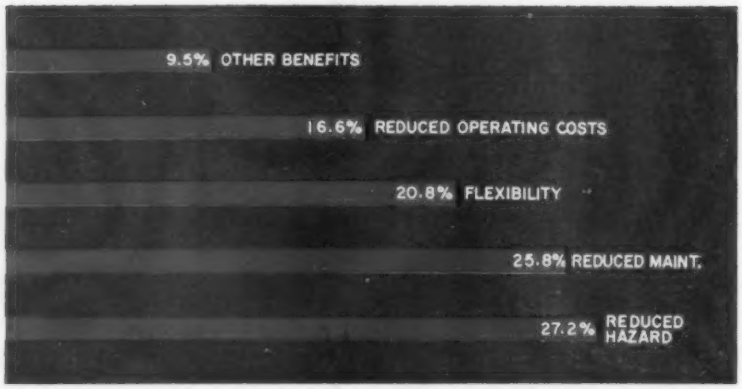
WE ARE RETURNING to the original 284 replies that indicated they had busway systems for answers to this question. Applications of busways are of value to everyone even if they have had no previous experience with them.

There were 373 uses listed on the 284 questionnaires. Many listed two and some three different uses for the trolley busways. The largest group 200 or 53.5 per cent were used on cranes and hoists. Assembly lines came next with 78 installations for 20.9 per cent. Test lines scored 30 replies and 8.0 per cent of the total.

There were 65 write-in answers describing other applications. These were classified into three categories describing in a general way the applications. Lighting installations accounted for 15 or 4.0 per cent of the applications. Feeders to motorized equipment generally considered stationary accounted for 14 replies for 3.7 per cent. Examples are welders, sewing machines and others.

Small hand tools and other portable equipment scored 36 applications with a percentage of 9.6. One reply described a rolling ladder with a connection to a trolley busway that permits connection of soldering irons and lights to the ladder for maximum convenience in serving these loads.

Question 9 showed the major use of trolley busways were for crane and hoist applications. Widespread use of trolley busway for assembly lines were also indicated. Other uses included test lines, feeding portable tools and lighting installations



Question 10 indicated a reduction in hazard to personnel as the outstanding benefit. Other benefits include a reduction in maintenance over systems formerly used, convenience and flexibility in moving equipment, and increased production

10 Question 10. If, in your opinion, your company has benefited from the installation of trolley busways, what has been the outstanding benefit?

THERE WAS A TOTAL of 234 respondents to this question. Of this number 225 listed benefits and many listed more than one for a total of 283. There were nine replies that either indicate dissatisfaction, describe situations in which they feel trolley busways have been misapplied or state that they would not use them if not required by local regulations.

Of the positive replies, the largest group with 77 answers or 27.2 per cent of the total stressed reduced hazard to personnel or improved safety. The next largest group, polling 73 replies and 25.8 per cent, stressed the reduced maintenance experienced with trolley busways.

Convenience and flexibility for relocating busway came in for a large share of the benefits described with 59 replies scoring 20.8 per cent. Increased production, lower operating cost and higher efficiency all contributing to reduced operating costs came next with 47 replies or 16.6 per cent of the total.

The balance of the replies totalling 27 or 9.5 per cent describe benefits that do not fall into the previous classifications and are of a general nature. Some deal with improved design of the installation due to the application of trolley busway. One reply mentions that the benefit is more storage capacity in less building area. **End**

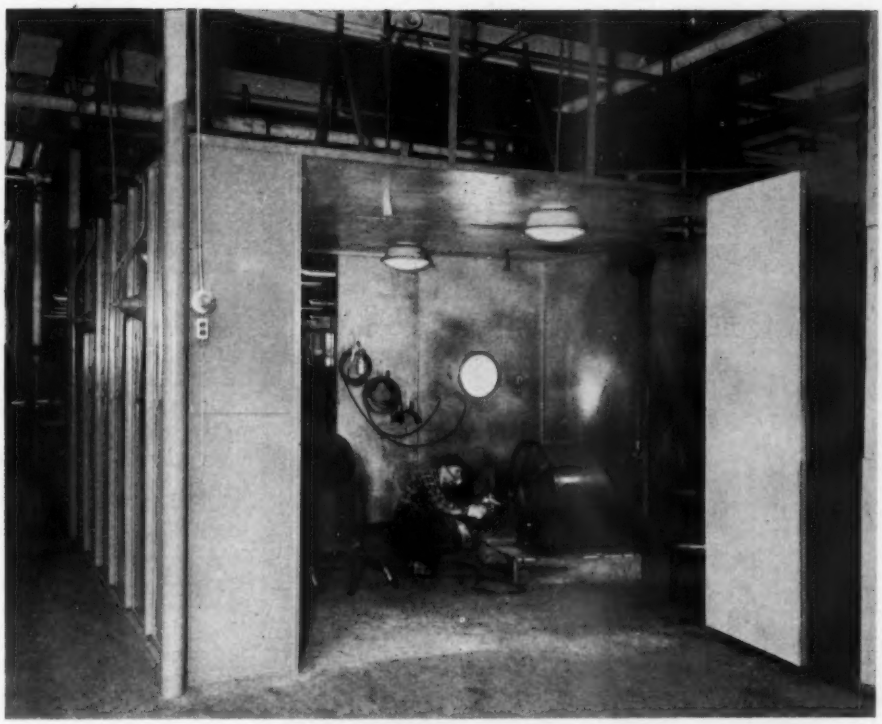


Fig. 1. Because the new paint spray booth is not located near an outside wall, it was necessary that special ventilation and a sprinkler system be incorporated in the design of the booth

New Paint Booth—New Location—No Bottleneck

Special Design Features Required Because of New Location

TO TAKE ADVANTAGE of straight-line production and eliminate jogs in the line, the Spencer Turbine Company has installed a paint spray booth right on the line.

Since the booth would not be located near an outside wall, it was necessary that it be of fireproof construction and have special ventilation and a sprinkler system incorporated in the design. These requirements were necessary to meet fire regulations.

Fig. 2. Another view of the paint spray booth shows the paint container, center foreground, and the compressor, at left, which are located outside the booth

Formerly, the paint booth was located at one end of the plant and a great deal of unnecessary shuffling of products was involved.

The new booth is 16 ft long by 15½ ft wide and 9 ft high. It has a floor area of 2480 sq ft. The openings, with doors shut, are 6 ft by 9 ft; with the doors open, they are 9 ft by 9 ft.

Ventilation for the booth is handled by two 24-in. ducts in the roof. These form a Y which leads into a 36-in. duct. A 36-in. fan is installed at the end of this second duct. There is a self-opening shutter in front of the fan. Air movement by the fan is 24,500 cfm at 5 in. H_2O. The fan is equipped with a 5-hp motor.

Small paper caps cover the sprinklers in the roof of the booth. These are installed to prevent clogging of the spray nozzles by the flying paint. The covers are made of paper and held on lightly so that any pressure of water coming out of the sprinklers will immediately blow them off. **End**

Fig. 1. View of one of the rocket engine test stands. Exhaust quenching storage tanks, on hilltop, their piping and valving stations are serviced by maintenance

Fig. 2. Some of the maintenance chores at plant include taking care of 26 miles of roads, 23 transformer banks, two sub-stations, 12 miles of power lines

Maintenance

Here is an example of out-of-doors plant engineering. . . .The maintenance men at this plant can say "Don't Fence Me In" and really mean it . . .At this plant, they cover a variety of jobs from building roads to special handling of missile fuels

ASK ANY plant engineer to define the limits of his responsibility and likely he'll shrug, "Guess you'd say they're pretty much confined to what's under-roof, plus a little landscaping."

Ask the same question of Maintenance Foreman W. C. Rich and he grows expansive. For his is a maintenance domain that spreads across three square miles of canyons and mountains, that involves more than 26 miles of road, a dozen dams, 12 miles of 4160-volt power line and some 125 buildings, small and big.

Rich is maintenance foreman at Rocketdyne's (North American Aviation division) 1600-acre Propulsion Field Laboratory tucked into California's Santa Susana mountains. Here, in a "plant" which is really an industrial city, 2700 technicians, engineers and supporting personnel are charged with the testing of liquid propellant rocket engines.

Rich and his canyon domain are prime examples of a new spatial concept of plant engineering, a concept as new as missiles themselves. For missiles, at a dozen secret test sites scattered across the U. S., have created what amounts to a new breed of plant; the out-of-doors plant. It differs markedly from today's open-spaced plants in the chemicals, petroleum and explosives industries.

The difference—and its effect upon maintenance—is three-fold: (1) security demands that internal maintenance staff do many of the jobs which most plants farm out to con-

Takes to the Wide Open Spaces

tractors; (2) a whole new technology—keyed to exotic fuels and other missile-age hazards—confronts the test center maintenance crew; (3) the program's "crash" status, which sees the plant at work around the clock, 365 days a year, upgrades maintenance to a higher level both in performance and technology.

In this new spatial concept—functioning since 1951 in the Santa Susana mountains but until now kept under tight security—maintenance has been given perhaps its biggest, widest, most expansive job in all industry. Maintenance employees look after pipelines and fuel handling plants; they maintain its roads; even take part in test firings. In fact, they even installed the plant's main power line.

Maintenance Problems

Isolation, the need for water conservation and the round-the-clock operations enlarge the missile maintenance department's problems—and also its function.

Water Conservation: rocket engines cannot be tested without huge gallonages of water. Rocketdyne through a series of 12 catch basins and dams, reuses 60 per cent of the millions of gallons which weekly quench its test stands.

Wells, varying from 30 to 225 gpm and rigged with deep-turbine pumps (nine of them 25 and 50-hp, one a 100-hp unit), supply millions of gallons a week. About 25 per cent of the water flows to Rocketdyne's domestic system. The remainder is pumped to big gravity tanks located on the ridges overlooking test areas.

One such storage complex includes ten 100,000 gallon tanks. At most test sites, water gravity-flows during firings to exhaust deflectors set deep in blast pits. At one of the vital sites, quenching water must be boosted to get sufficient quantity at the flame deflector. Boosting the flow are two 900-hp gasoline engines.

Evaporation is high, because firing temperatures are high. About 40 per cent of the gallonage is lost in the quenching process. The remainder flows to a series of ponds. From here, below water-level skimmer pipes accumulate the run-off in a main pond. From the pond it is pumped back to the hilltop and into a contaminated water system for reuse.

How strategic are the wells to Rocketdyne's operations? Well, some months ago a well failed. Another, though recently drilled and rigged with a pump, was not piped into the system as yet.

"We've got to have water," was the urgent word from a test site.

Plant maintenance men went to work—fast. They flat-bedded a 125 kva diesel standby to the newly-drilled well, tied the power plants to its pump. Even with this hook-up more pump capacity was needed. A fire truck called into service used its pump as a booster. Maintenance laid three-quarters of a mile of 3-in. fire hose to a hilltop storage tank. That did the trick.

Says Rich, "We ran that way for a week, until pipelines went into service. And rocket engine tests were kept on schedule."

Another problem is pressure. The 24-in. diameter pipes (with 5.16-in. steel walls) carrying water to the test areas work at 175 psi. Recently one ruptured. Although the pipe was buried six feet underground and overlaid with two inches of black top, the pipe burst to the surface. No spare sections were on hand. Rich put 15 men on the untrenching job. That was at 6 p.m. Next morning a contractor was called in. But time was short and the only pipe the contractor could find was 30-in. diameter. It was swedged in and welded. And less than 30 hours after the break, the line was operative and supplying the test site.

Missile Fuels: Rich and his crews daily work with chemicals and fuels foreign to most plant engineers. Among them, liquid oxygen, which if not properly handled, can become extremely dangerous.

"You play a lot of this maintenance by ear," says Rich. We're

Fig. 3. A member of the maintenance crew mans one of the deep well pipelines. Millions of gallons of water are required each week to quench the test stands

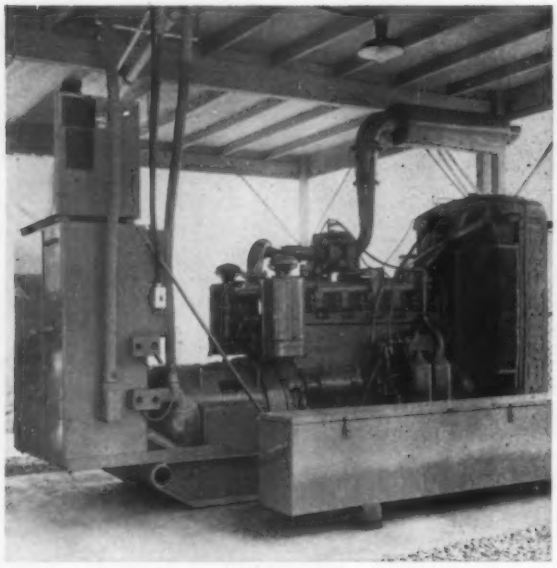


Fig. 4. This diesel generator set, one of three in use, powers the security lighting in case there is an electrical outage

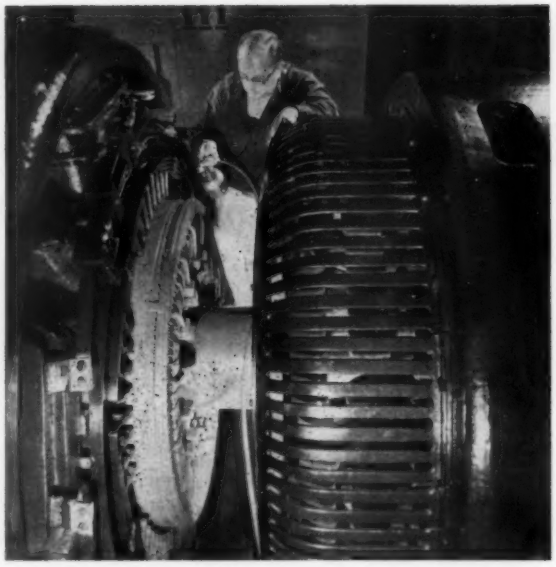


Fig. 5. This 42-year-old motor generator set, delivering 1200 volts d-c, has chalked up more than 5000 hours of service

asked to run lines for fuels which nobody ever heard of 10 years ago. Fuels you can't find in maintenance handbooks."

For example, Rich had a week's notice that he was to take over maintenance on a liquid oxygen plant which is contractor-operated.

Special Handling of Fuels

"We didn't have anyone on the staff trained in liquid oxygen handling, or any spare parts either. In a week, though, we found both. We put our men through a propellant safety course, a course they repeat several times a year, and have been maintaining the plant without a hitch ever since."

Economy Power: The maintenance staff also finds itself looking after a powerhouse relic—which has nothing to do with the age of missiles.

When the facility had urgent need of motor-generators to provide power for the plant's missile engine pumps, Rocketdyne engineers faced two sizable problems: they needed power—lots of it—and as soon as possible. Cost was another factor.

Engineers stumbled upon a 42-year old motor generator set. It belonged to an interurban railway which abandoned its powerhouse. The generator was exactly what was needed. A search located three surplus 1300 v d-c motors—which had run World War II submarines.

These workable relics from land and sea were installed in the powerhouse, along with their original air-actuated circuit breakers and meters. If new, the set-up would have cost $500,000. Rocketdyne got by for only $80,000. More important, the plant cut 14 months off lead-time—had it been necessary to build the power units.

Maintenance took over the upkeep of this equipment. Result: the motor generator unit—among the heaviest ever made—has kept running without an hour's downtime charged to failure. The 42-year old generator has chalked up more than 5000 hours since its installation.

Expanded Responsibility. The maintenance department, besides handling such routine chores as building maintenance, has put in the 12 dams (and are adding two more). They installed the plant's 12 miles of 4160-volt power line and daily run a check on it. Involved in the plant's overall power system there are 23 transformer banks and two sub-stations.

"Tool boxes?"

Other Maintenance Chores

In addition to power system, maintenance personnel maintain 27 highly specialized liquid fuel and liquid oxygen tanks (storing thousands of gallons of propellants). Then, too, there's the matter of roads. Of a total of 26 miles, 10 are asphalt, 4.5 rock and oil, and 12 of the roads are unimproved.

Rich supervises the service shops which look after the test site's 207 pieces of mobile equipment (including eight fire trucks), 210 material handlers (from fork lifts to diesel cranes). Additionally, he supervises maintenance of more than 1,800,000-sq ft of parking, service and test areas; and 2,500,000 sq ft of plant floor area.

That's a glimpse of many-functioned role of maintenance in the missile age. Today, at test sites like Rocketdyne's, maintenance finds itself with an expanding responsibility. For in missiledom, at least, maintenance isn't confined to what's "under the roof." **End**

Fig. 1. Operator's written instructions from this central station are transmitted automatically to supply areas in other parts of the plant. This makes possible delivery of proper component parts to assembly line at right spot to fit any model refrigerator called for on schedule

How "Electronic Longhand" Cuts Warehousing

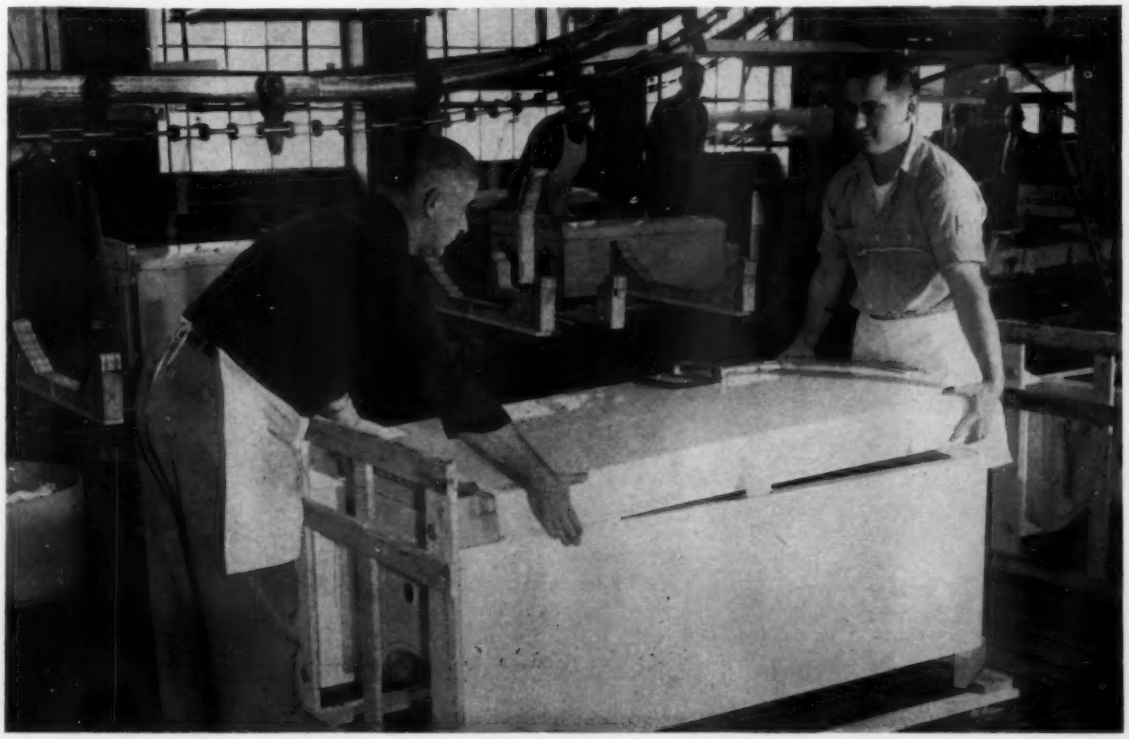
KELVINATOR'S Grand Rapids plant manufactures all Kelvinator and Leonard refrigerator cabinets, assembles the finished refrigerator, and produces all Kelvinator and Leonard electric ranges. Before installation of their Telautograph system, the assembly division normally scheduled runs ranging from 500 to 2000 cabinets of various models. The cabinets were stored in warehouses.

It took many days' production to rotate the complete model line and a large warehouse inventory was necessary before a variety of cabinets was available for shipment to distributors. This method was costly and caused delay in shipping many times because the required models were not available. This resulted in "back-ordering" and too much waiting at distributorships and dealer-points. To eliminate these conditions Kelvinator decided to adapt T/A scheduling to its assembly lines.

The operator of this "electronic messenger" writes a coded descrip-

(Continued on page 270)

Fig. 2. As scheduled by Telautograph, the specified food compartment doors are being sealed, insulated, fitted with emblem and plate, trim, hinges, latches, inner panels and gaskets. At the assembly line they are mounted on the proper cabinets



How To Repair

Fig. 1. Portable furnaces are built of 16 ga steel, and asbestos. The part to be welded is surrounded by furnace to extent required for proper stress relieving

WELDING STILL holds a prominent place in today's methods for repair of large castings. Prior to the introduction of the cold metal repair methods discussed in the September issue of PLANT ENGINEERING, welding was the only reliable method of repair available. Yet the difficulties encountered due to introduction of residual stresses were often so great that no repair could be made at all.

There is still considerable difficulty encountered in cast iron repairs and it is somewhat doubtful that we will ever be able to completely circumvent these inherent problems by some unique welding process. Steel casting welding is another story. A new method, cyclic welding, has been developed and gives every indication of being the long awaited answer for a reliable method of steel casting repair.

Cyclic Welding

This new arc-welding process, which consists essentially of welding at elevated temperatures and stress relieving in cycles, is a direct result of the disadvantages normally encountered in Thermit welding. For a long time, Thermit welding was the only known welding method for repairing large steel castings. It consists of pouring molten metal into a prepared weld section, thereby casting a new section for the repair.

Principle disadvantage in Thermit welding is essentially the same as that encountered in pouring steel ingots or thick steel castings: the molten metal cools from the outside first, leaving the liquid core subject to piping, cracking, and severe internal shrinkage stress.

Specific advantages of cyclic welding can be summarized as:

1. Critical areas can usually be welded with a sound weld material of high strength replacing a weaker material which often contains an obvious flaw.

2. Large fillets can be formed to replace sharp corners and other stress risers.

3. Areas subject to tension can be prestressed by peening and pre stressed in compression to alleviate recurrent failure in tension.

4. Design changes can be incorporated to provide reinforcement where desired.

5. Complete stress relief can be given to restore the original stress-relieved conditions and eliminate possibility of other highly fatigued areas which may have developed during operating history of the equipment.

Temperature at which the welding should be done in the cyclic method is one that is as close as practicable to the lower critical temperature of the steel (about 1000 F) which is also the lower limit of the plastic phase range of steel. It is, of course, impossible to perform all welding in the temperature range between the elastic and liquid ranges of the material, and some lower temperature must be selected where the welder can be protected from the radiant heat.

Welding Temperatures

In general, most of the work is done at temperatures of 600-1000 F. These temperatures are accomplished by means of portable furnaces, Fig. 1, which use charcoal as a fuel. The point at which stress relieving begins is very critical and can be determined only through extensive experience.

The weld is prepared like any other arc-welding in that a 30 deg truncated groove is cut at the site of repair by scarfing. Arc welding then begins in the root and proceeds to the point where stress relieving should start. This point is dependent on the size and the shape of the repair and on the restraining stresses placed against the weld section. Where free-end conditions exist and where shrinkage is not restrained, welding can proceed for several

Heavy Equipment by Welding, Brazing

Residual stresses, long-time bugaboo of welding repairs on big masses of metal, can be relieved by cyclic welding of steel castings . . . Cast iron repairs are still difficult, says the author . . . Examples of jobs successfully completed are detailed in this third installment

By R. L. RECTENWALD, Maintenance Engineering Corp., Pittsburgh, Pa.

inches of thickness before stress relieving starts.

In other repairs where there is a heavy restraint on the weld section or where there is a resistance to deformation by weld shrinkage, the weld can fracture after a few passes. Some control over this condition is possible by using the proper restraining members, by careful preheating of specific areas, and by heavy peening to stretch the weld deposit.

Weld materials are important, of course, in that they must not be subject to embrittlement or fracture in the temperature ranges where either welding or stress relief occurs. One apparently obvious solution would be to stress relieve by torch or other local heat in a restrained area. This, however is so detrimental that it usually causes weld fracture in an otherwise good weld.

Temperatures and the specific areas subject to them are extremely important, particularly at this stage. A difference of 300 F can cause cracking in many materials and a difference of 200 F is often sufficient to cause yielding in restrained sections.

After the first weld deposit is completed, the entire section is stress relieved in such a way that free-end conditions are approached as nearly as possible. Stress relieving is usually accomplished at about 1150 F. After stress relieving, the weld section is inspected by the magnetic particle method.

Shrinkage occurs in the outer fibers of the weld; all internal fibers are in a state of compression due to welding. Hence, if fracture should occur, they will be in the outer fibers of the weld where they can be detected by the magnetic particle

Fig. 2. This is the broken crankshaft of a 450 ton dragline scraper prior to repair, using the cyclic welding method

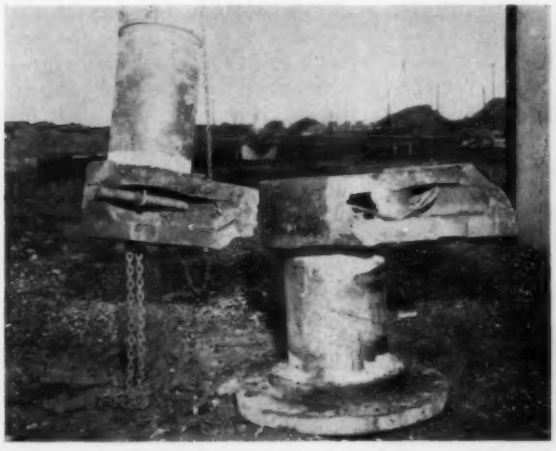


Fig. 3. After preheat temperature has been reached, the wall of the furnace is torn away to permit ready access

Fig. 4. Bearing chuck of blooming mill engine after brazing, before finishing

method. The process of welding and subsequent stress relieving is repeated until the weld is completed. It is then stress relieved and inspected one last time.

Cyclic welding completely avoids build up of harmful residual stresses at any time. If welding limits are exceeded the fractures extend only to the surface that was previously stress relieved, making repair immediate and comparatively simple. The method is applicable to most repairs formerly made by Thermit welding and there seems to be no limit as to the amount of metal that can be deposited or the size or shape of repair which it can accomplish.

It has been used on steel castings as large as 24 by 48 in. in cross section, weighing up to 200 tons. It has been used on forged steel crankshafts of 24 in. diameter and in alloy steels equivalent to SAE 4140 and 0.70 carbon steel.

Pieces on which it has been applied range from massive 300 lb gear teeth to engine frames. Of course, it happens many times that a process like cyclic welding comes to the rescue when large castings are involved.

The Sunnyhill Coal Company of New Lexington, Ohio, for example, uses large dragline shovels in their operations. When a 0.25 carbon crankshaft on one of these shovels fractured, Fig. 2, a frantic search for a replacement revealed that there was only one spare crankshaft for seven similar machines operating in this country. A spare could not be obtained. Even if a spare could have been obtained, the cost would have been approximately $8,000. The repair job was done by cyclic welding, at a total cost of about $1,500. Within six months, another crankshaft identical to the first one suffered a similar fracture. The process was repeated. Both crankshafts are still in operation.

Completed cyclic welds have both high tensile strength and high ductility. Cyclic weld strength range exceeds 100,000 psi with ductility of 30 per cent elongation in 2 in. What's more, the cyclic weld is always homogeneous.

Cast Iron Welding Repairs

As mentioned, cast iron is notorious for its poor weldability characteristics and resistance to fabrication due to the inherent stresses introduced during repair. Brazing or bronze welding is an old and well established method that is still used in welding cast iron.

Brazing assumes a slightly different character when applied to the repair of large castings. Preheating is necessary in brazing. The preheat temperatures are about 1500 F and hence, when making bronze welds of hundreds or even thousands of pounds, the operator's discomfort is considerable. For this reason, the work must be arranged for two or three welding torches used together with only two men per torch.

The maximum length of time a man can stand the radiant heat from the high preheat temperatures seems to be about ten minutes. Because of the discomfort and inconvenience, heavy brazing of large castings is rapidly becoming a lost art. It is still, however, the best known welding method for repairing very large cast iron castings.

Tensile strength of bronze welds is about two to three times that of gray cast iron and good bronze welding is arranged to give the weld a bond of strength equal to its tensile strength. This is done by chipping all surfaces clean and smooth so that a bond area is left around the weld that is about equal to twice the cross-sectional area of the part being repaired. Experience shows that this ratio provides a factor of safety that gives the desired bond strength.

High preheat temperatures necessary for brazing are obtained with a furnace built of 16 gage steel, and so constructed around the piece that there is about 12 in. of fire around the work. The fuel is charcoal and coke. Temperature is regulated by using asbestos paper as a damper to close the draft. Temperatures can be controlled to a plus or minus 50

F. The furnace is cut away, Fig. 3, as the work progresses, to make the work accessible.

Some rather spectacular repairs have been accomplished by the bronze welding method. One such was the repair of a completely wrecked blooming mill engine. A stuck throttle caused the connecting rod to be thrown from the engine causing a 26 ft fracture stretching through the main bearing to the grouting; a completely broken top back of the bearing chuck; and a fracture of the connecting rod itself at the crosshead bearing.

Further diagnostic studies with various testing methods showed additional damage. Most of these repairs were made by the Mecostitch cold metal repair method, but the bearing chuck was broken into too many small pieces to permit such repair. Fractures in this area were also diagonal rather than perpendicular to the surface.

As an example of how brazing is usually set up to allow free-end conditions, all brazing was done before any attempt was made to repair fractures by the Mecostitch method. This permitted free movement of the adjacent casting during temperature expansion while brazing. The complete repair of the bearing chuck, Fig. 4, required 700 lb of bronze welding rod.

Bronze Welding Job

Another very large bronze welding job, requiring 1850 pounds of bronze welding rod, was the repair of a completely wrecked 16,000-lb steam hammer. The frames, cylinder, foundation plates, ram, and anvil were all either fractured or completely broken. The hammer was part of the production machinery of a tool steel manufacturing plant and produced about half of the total ingot output of the plant. Total repair time was three weeks compared to the six or nine months that would have been required to obtain a replacement.

Here again, the areas where pieces were missing, shattered or worn were repaired by brazing; and fractures which were in relatively flat areas and where edges were perpendicular to the surface were repaired by the Mecostitch method. All parts of this hammer are subject to extremely high shock and impact loads. The repaired hammer has been restored to its original strength and is still operating.

It is sometimes necessary particularly after welding to machine rough or slightly misaligned pieces. When the part to be machined is a portion of any overall casting, or when it is difficult to dismantle or ship, machining can become an extremely difficult problem. For this reason, location machining facilities are essential for large casting repair.

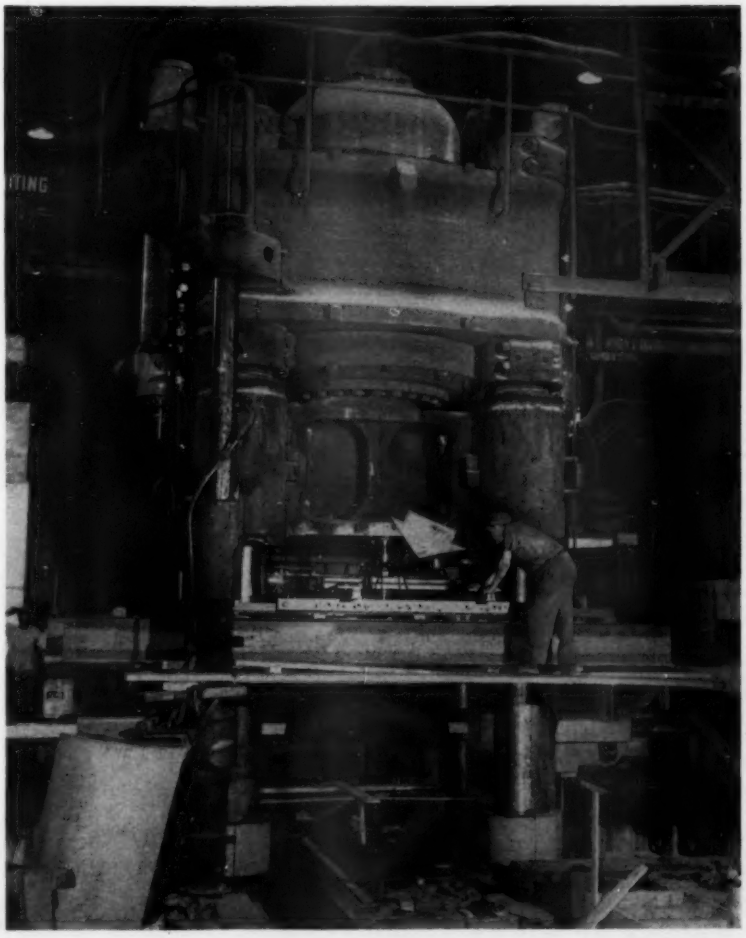
Portable machine tools are available to do all types of milling, shaping, boring, turning, planing, burnishing, grinding, and honing. The machining rates and the costs of operation of these portable tools are not competitive with those of production machines, but the savings resulting from not having to dismantle and ship pieces to be machined, offset their higher rates.

With skilled operators and set-up men, the portable machine tool can hold commercial tolerances. For instance, the portable milling machine in Fig. 5 is set up to remove 2 in. from the top platen of this 5000 ton hydraulic forging press. The milling was done overhead and a flatness tolerance of 0.003 in. was held over the 25 sq ft area.

There are some difficulties in location machining that arise primarily from the fact that there is no great demand for portable machine tools and consequently little year-to-year development is done on the various models available. It is necessary for the people who use these machines as part of their daily work to do their own development and to employ machinists who are particularly adept at improvising fixtures and machining methods.

Three repair methods—Mecostitch cold metal stitching, cyclic welding, and brazing—coupled with diagnostic test methods can rehabilitate large machines which fail. **End**

Fig. 5. Milling machine (arrow) set up to remove stock from forge press plate



Fast Whirl Improves Product

Plant Engineering's Centrifuge Eliminates Voids in Sealant

By R. C. BEAVER, In Charge Mechanical Group, Plant Engineering
R. HAMILTON, Project Engineer, Douglas Aircraft, El Segundo

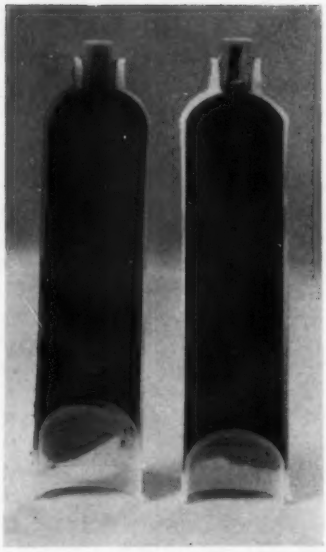


Fig. 1. Cartridge of sealant on left has been centrifuged. One on right has not been; note bubbles appearing in tube

Fig. 2. This photo of welded base shows motor mount. Power is provided by high resistance motor rated at 7½ hp driving rotor through a 1 to 1 ratio V-belt drive

CENTRIFUGING of high viscosity sealing materials has removed entrapped air, improved their physical properties and increased their resistance to attack by fuels.

An extensive survey at the Douglas El Segundo division, of their aircraft fuel, pressure sealing and electrical potting compounds revealed that a considerable quantity of air was entrapped in these materials during mixing. Seals made with such compounds are porous. Even the most careful application did not prevent the forming of voids which are a potential source of service failure.

Immediately after mixing, a compound is packed in small polyethylene sealing cartridges and refrigerated at —30 F until ready for use. These filled cartridges are slipped into air-driven sealing guns for application. The refrigeration arrests the catalytic action inherent in the mix and keeps it fluid until applied, after which the action begins and the compound sets up.

Materials and Process Engineering began an investigation that con-

Fig. 3. Operator loading centrifuge in laboratory. Maximum of 30 cartridges may be centrifuged at one four-minute cycle

sidered centrifuging the compounded material before application to eliminate the air entrapped.

Specimens of mixed compounds were prepared and half of them were centrifuged with laboratory equipment. They were then cured under controlled conditions after which all specimens were sectioned and photographed.

The photographs of similar compounds showed that the centrifuged specimens were practically free of entrapped air while those not centrifuged contained considerable voids.

Cured centrifuged specimens, subjected to density and Shore hardness tests, showed complete uniformity in any part of the cured material and consistently improved physical properties. The centrifuged specimens also showed considerably more resistance to the absorption of the liquids they were to contain.

When centrifuged compounds were thus laboratory proven superior, Plant Engineering took over the design of a production centrifuge. Standard Plant Engineering principles dictated safety, compactness and ease of maintenance. Safety in this case was of paramount importance because, at the contemplated peripheral speeds, a one pound cartridge would operate at what, in aircraft terminology, is called 3000 G's (the cartridge would weigh a ton and a half on the periphery at top speed.) The speeds, the stresses and their control presented problems not too dissimilar to the control of a loaded bomb.

Base Bolted to Floor

The base, therefore was built as a heavily reinforced welded pedestal that could be bolted to the floor. Through its center rises the drive spindle on which is mounted the rotor that accepts the filled cartridges.

The rotor is made from a 36 in. diameter forged disk of 75-T6 aluminum. It was tested before and after machining ultrasonically and by x-ray. Thirty round slots were bored at 45 deg from the top face radically to accept the filled cartridges. After complete machining it was painstakingly dynamically balanced and this required almost a week on special equipment.

This rotor revolves in conventional sealed radial thrust bearings, but the heavily loaded top bearing is separated, or isolated, from its steel housing by a thin wall consisting of concentric rings of 70 Shore neoprene. This somewhat unorthodox mounting serves a dual purpose—the absorption of vibration due to minor unbalanced loads, but permits immediate tripping of a stroboscope in the case of major unbalance, due to deflection from true vertical.

The spindle is driven by a special Sterling motor made for the job. This is a high resistance motor, rated 7½ horsepower, but it draws about 50 horsepower on the starts that require about 30 seconds. Actual drive is on a 1 to 1 ratio through Gilmer belt drive which develops 1680 rpm. (A supplemental "quick change" drive is available at spindle speed or 1960 rpm.)

A magnetic brake stops the motion in 30 seconds when the Eagle

(Continued on page 266)

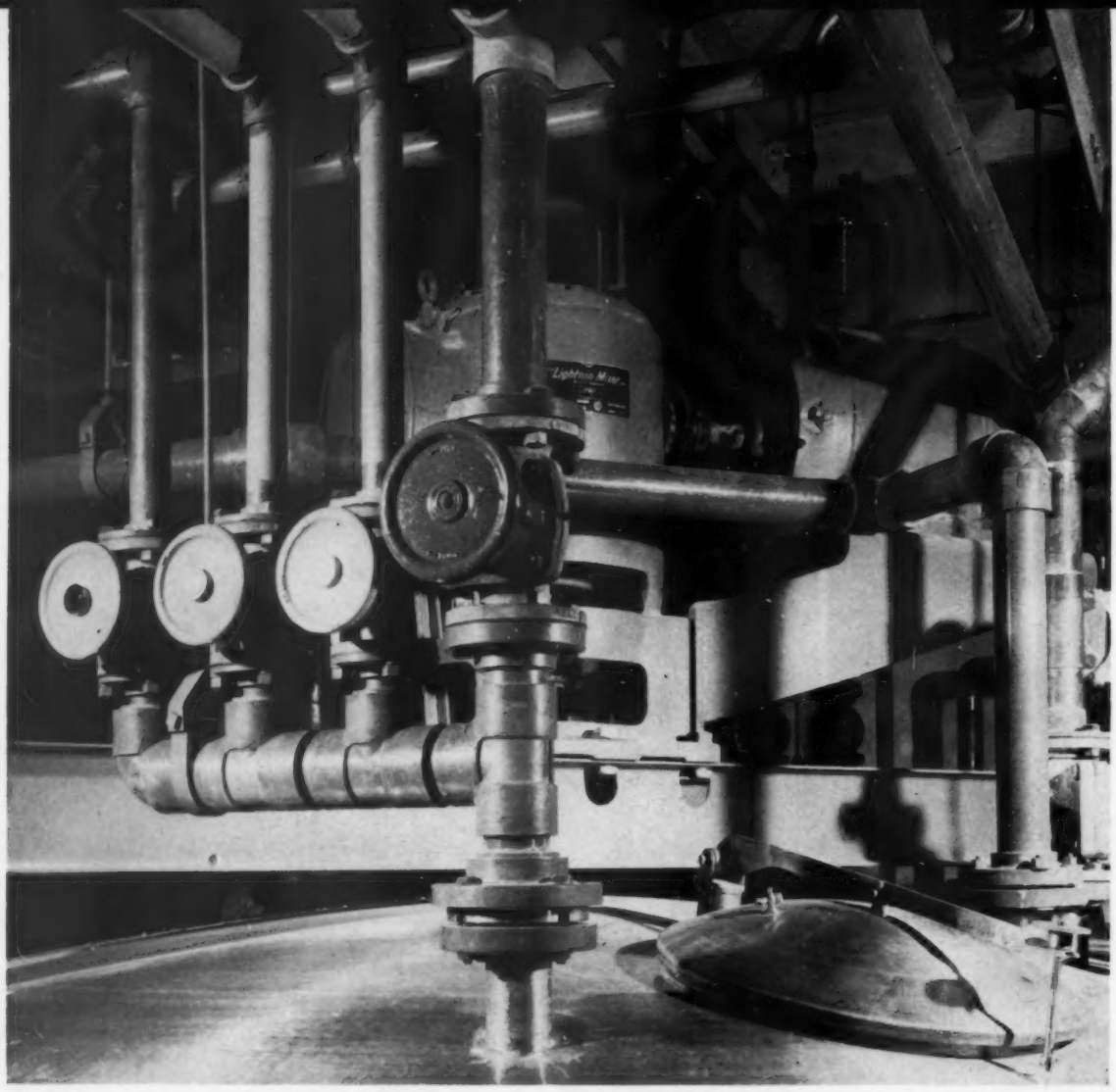


Fig. 1 Manifold of plastic piping feeds liquids into stainless steel tank. Vari-colored valves indentify materials in lines

Plastic Piping's Here To Stay

These In-Plant Installations Show What's Being Done With It

INDUSTRIAL PIPING SYSTEMS, made up entirely of plastic pipe, are becoming more commonplace everyday. In the chemical field, particularly, where corrosion resistance is a vital factor in piping systems, plastics are proving themselves in hundreds of installations.

In March, 1956, PLANT ENGINEERING presented a review of the booklet "Pipelines To The Future", which was prepared by the Monsanto Chemical Company, to report findings on the use and applicability of plastic pipe. Since that time, many new uses for plastic pipe have been tried and proven, and published reports verify the suitability of plastic piping to industrial liquid handling.

Several typical examples are shown here to illustrate that "plastic piping is here to stay."

Figure 1 shows two-inch rigid vinyl pipe, made from B. F. Goodrich Chemical Company's Geon resin, connected to the inlet header of a stainless steel reaction vessel. This installation is in the aluminum hydroxide plant of the Reheis Co., Berkeley Heights, N. J. An interesting feature of the installation is the use of various colors of plastic in casting the bodies of the valves. This built-in color coding identifies the material being carried in the line.

Small-diameter piping is extensively used in a system of polyvinyl chloride pipe installed at the Bayonne, N. J., plant of Pathecolor, Inc. An important advantage of the system is the quick and easy changes made possible by using the plastic pipe. The rigid PVC pipe can be cut with a hacksaw and re-assembled in a few minutes.

The control panel and replenisher panel for color film processing at Pathecolor is shown in Fig. 2. In the entire plant, Pathecolor is using

some 10,000 ft of unplasticized PVC pipe, made by the Alloy Tube Div., Carpenter Steel Co. The pipe carries potassium ferricyanide in five per cent solution at 80 F, sulphuric acid in one per cent solution at 80 F, and hydrobromic acid in three to four per cent solution at room temperature.

All of the fittings in the system are the socket type—installed by first cleaning with methyl ethyl ketone, applying a solvent cement, pushing the fitting onto the pipe, and twisting it 90 degrees into place. Installation time at Pathecolor was estimated at one-fifth that required for metallic piping systems.

Used in the system are ½-in., ¾-in., 1-in., 1½-in., and 2-in. pipe sizes and various fittings including tees, elbows, reducing bushings, unions and both needle and gate valves.

In addition to the convenience of easy piping changes, the PVC piping also offers total resistance to all of the chemicals involved. The absence of a plasticizer in the pipe also eliminates all danger of contaminating the solutions.

"Hot" News On Plastic Pipe

A MAJOR STEP toward the development of plastic hot water pipe—long hoped-for in the industry—has been taken by scientists of United States Rubber Co.

In laboratory tests, Kralastic HTHT, a new material, has carried water heated to the boiling point, as well as low pressure steam.

Most immediate use for pipe made from the new material will be in radiant heating systems, while further development should permit its use in domestic hot water systems. Industry is also testing the new plastic for pipe in hot acid service, and in molded parts exposed to high heat, such as duct components.

Tests show that the rubber-plastic material has considerable strength at 220 F, while the plastics now in general use are not recommended for application in temperatures exceeding 175 F.

Chemically, the new material is a combination of acrylonitrile, butadiene and styrene.

Not an industrial application, but certainly typical of an industrial waste disposal problem is the piping arrangement shown in Fig. 3. Shown is part of the system of rigid PVC pipes installed at Hoover High School, North Canton, Ohio. The piping system, which runs from the laboratory to the basement to the roof, will drain off chemicals and other waste material used in laboratory experiments. The vertical risers will also function as vent stacks for the fumes generated in the laboratory wastes.

Four-inch pipe is used for the main trunk line, and two-inch pipe for the drains. Rigid Koroseal pipe, manufactured by B. F. Goodrich Industrial Products Co., was selected for the installation because

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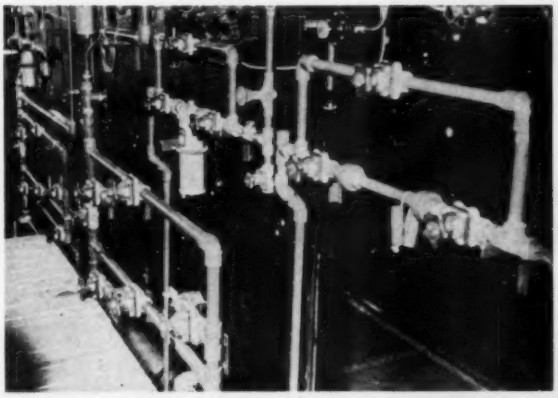


Fig. 2. Plastic piping "maze" is a feature of control panel

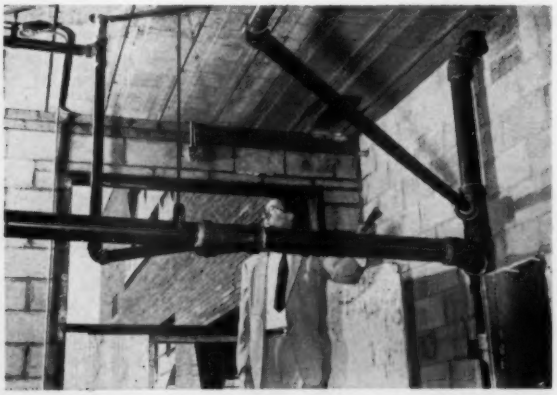


Fig. 3. Rigid PVC piping handles school laboratory wastes

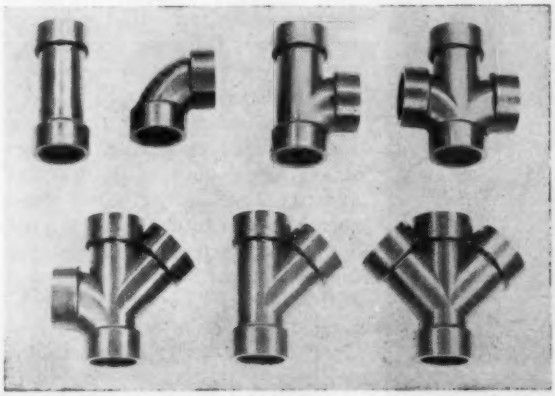


Fig. 4. Various drainage fitting types are injection molded

Fig. 5. Transfer lines for chemicals are four-inch rigid PVC

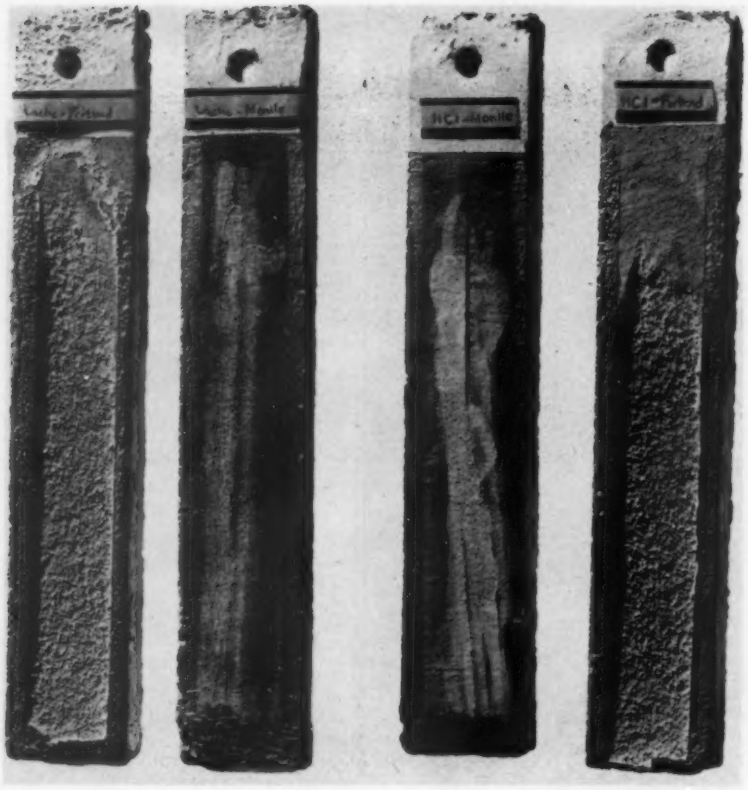


Fig. 1. Results of acid resistance test: center blocks are Monile, outside blocks concrete. Blocks at left were tested with lactic, right, with hydrochloric acid

Flooring Material Takes on Tough Jobs

It Tackles Anything From an Acid to a Heavy Truck-Traffic Problem

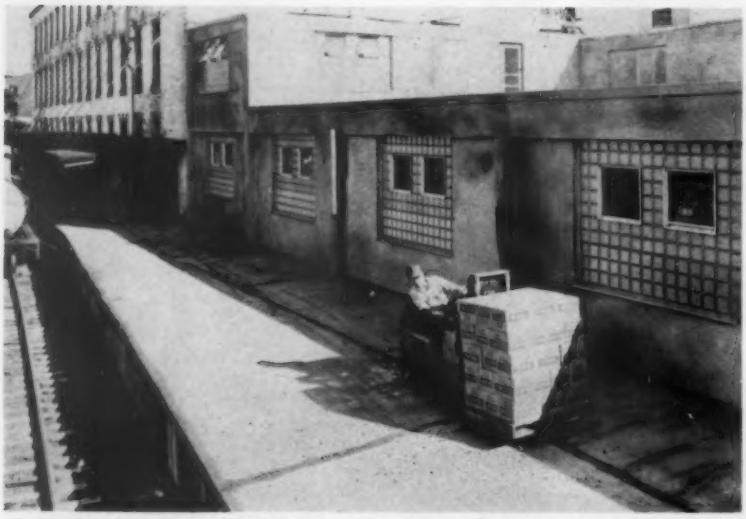


Fig. 2 Dock area at Welch Grape Juice developed trouble spots from sugar, acid, truck traffic. Dock plus sections in plant are now covered with Monile

WHAT FLOOR SECTION in your plant is giving you trouble? Is it in the pickling department, in the canning or bottling section, in the plating area or in your heavily-travelled industrial truck area? This new flooring material may help you solve such flooring problems in your plant.

The manufacturer of this material, identified as Monile, describes it as having unusual flexural and compressive strength, all-round chemical resistance, as well as good bonding characteristics. It also has high resistance to freeze-thaw and sharp impact. The material can be applied with equal success to concrete and wood. It cures rapidly.

Figure 1 illustrates the results of an acid test which was conducted

with this material. The two center blocks are Monile and the two outside blocks are concrete. The edges of the blocks were coated to create a run-off channel.

Normal lactic and hydrochloric acid solutions were allowed to drop over the surface of the samples. After 900 milliliters of acid had run over the samples, loose material was brushed from the surface with a brass brush. The loose material removed during the brushing was collected and weighed. Six test cycles were performed on each sample block. The results of this test are summarized in the table.

Table shows losses of cement per 100 gallons of acid run over the surface

	Concrete		Monile	
Acid	Lb	Inches	Lb	Inches
0.1 Lactic	9.9	0.100	0.30	0.003
0.1 Hydrochloric	10.0	0.100	0.11	0.001
0.1 Citric	5.3	0.100	0.22	0.004

Acid Resistant

Based on these tests, the company states that the resistance of Monile floors to hydrochloric acid is 35 times greater than that of concrete. Its relative resistance to citric and lactic acids is 24 to 29 times greater.

Figure 2 shows the flooring installation at The Welch Grape Juice Company, Inc., Westfield, N. Y. In this plant, grape juice, with its very high sugar content, had been a major source of floor problems for many years. Floors in all the plants are subjected to grape juice spillage, acids, water, strong alkali cleaners as well as heavy lift truck traffic. In addition, sugar and acids carried onto the loading dock by foot and truck traffic caused faster deterioration of concrete.

In this installation, a half-inch thick surface of the flooring material was applied over the entire dock area. In the pasteurizing areas, a half-inch thick surface was also applied after thoroughly cleaning the existing floors to remove accumulated sugar. Floor areas that previously deteriorated rapidly are now withstanding these extremely difficult conditions.

At Gerber Products Co., Rochester, N. Y., the floors were continually exposed to spillage of fruits, meat and milk products, Fig. 3. They are washed daily with strong cleaning solutions. Erosion of concrete and floor sections breaking under steel casters caused rapid deterioration and frequent replacement.

The application of Monile has improved the working conditions by making the floor safer and materially contributes to the higher standards of sanitation. During application the material was also bonded to the legs of the equipment to form a tight sanitary seal. The floor is still in good condition after more than three times the life of the adjoining surface, Fig. 4.

Since half-inch applications are recommended, there is no necessity for cutting out the old floors. The ingredients can be mixed in conventional cement or plaster mixers and any surface attainable with concrete can be obtained by troweling without impairing the non-slip qualities of the material. **End**

Additional Information

If you would like more information about this flooring material, just write to the Editor, Plant Engineering, 308 E. James St., Barrington, Illinois, or indicate "Monile" on the post card in this issue.

Fig. 3. Erosion of concrete at Gerber exposed to spillage of fruit, meat and milk products and daily washings with strong cleaning solutions is quite evident

Fig. 4. Same view after the floor was covered with Monile. The floor is still in good condition after more than three times the life of adjoining surface

Remodeled reception lobby (right) with stairway leading to administrative offices. Company's own ceiling lighting is installed

Difficult To Believe?

This ➡ Once Looked Like This ⬇

Office Modernization: Case Study at Sunbeam Shows Some Possibilities

MODERN BUILDING materials along with functional design were used when the administrative offices of the Los Angeles plant of the Sunbeam Lighting Company were rejuvenated. A new building front was installed, the reception lobby completely remodeled and office space was rearranged and modernized. Restful colors, modern furnishing and air condition completed the change.

During modernization, various types of the company's own lighting fixtures were incorporated in the various office designs and in the reception lobby, to blend with the architectural patterns and provide maximum lighting efficiency. A large conference room is lighted by a variety of fixtures that can be turned on and off in desired installation patterns.

When an engineer visits the company, a tour of the reception lobby, offices and conference room shows him the different types of lighting fixtures operating under ideal conditions. **End**

Building front design was modernized with aluminum sheeting, tile and marble

Hallway looks like this now, (right, above) with newly paneled walls and full-length lighting. Part of passage before change, is seen at lower right

This is how the plant administrative offices appeared before the modernization

Fig. 1. Aerial view of J & J plant site shows stepped arrangement. Connecting buildings house production offices, test labs

Building a Plant?

People Are Important--Design for Them

PEOPLE MUST BE counted as one of the primary design considerations of any modern industrial plant. Where people will travel within the plant, where they will eat, rest, receive medical treatment, park their cars—these questions must be answered during the plant design stage, along with the host of other design requirements.

When Johnson & Johnson built their new surgical dressings plant on a 300-acre site in North Brunswick, N. J. the plant personnel problem was studied closely. Johnson & Johnson wanted an efficient plant, where each internal manufacturing operation was arranged for maximum flow of materials and minimum handling. The company wanted best possible utilization of all production and warehousing space. Expansibility was another prime requirement.

At the same time, Johnson & Johnson was concerned with personnel. Close company-employee relations and the number of employees with long service records are a source of pride.

How Johnson & Johnson and Walter Kidde Constructors, Inc., the firm in charge of design and construction, produced a plant that satisfied both efficiency and employee comfort requirements is a study of effective plant planning. Completed in April, 1957, the plant combines excellent working conditions with expansibility, efficient materials handling, maximum space utilization and architectural attractiveness.

Selection of Plant Site

An important preliminary question which directly concerned plant personnel was selection of the new plant site. The new plant, in its initial stage, involved relocation of four existing Johnson & Johnson operations: baby products manufacturing, formerly at Cranford, N. J.; orthopedic products and surgical adhesive products with an allied plaster mill, previously located at New Brunswick; and a warehouse and shipping center formerly at Edison Township, fifteen miles distant.

Design based on a single large plant building received a good deal of preliminary attention, due to the number of advantages it possessed. But the planning group found that there were always compromises involved in staying inside building walls. One of the problems involved was autonomy of the manufacturing operations—a favorite Johnson & Johnson practice; separate operations had proved highly effective, and personnel had a sense of satisfaction and accomplishment. In a single large plant, this autonomy might be impaired. Closely allied to autonomy was scale; in a large plant building, size of the overall operation could tend to dwarf individual contributions.

In an attempt to gain a building with better expansion potential and to solve the problems of autonomy and scale, the planning group considered separate buildings. A materials handling idea made the separate-building idea practicable. For intraplant handling of finished goods, Johnson & Johnson planned a dragline conveyor routed between buildings as well as within them. The

Fig. 2. Short walk to cafeteria, right, is pleasant ''break'' for personnel

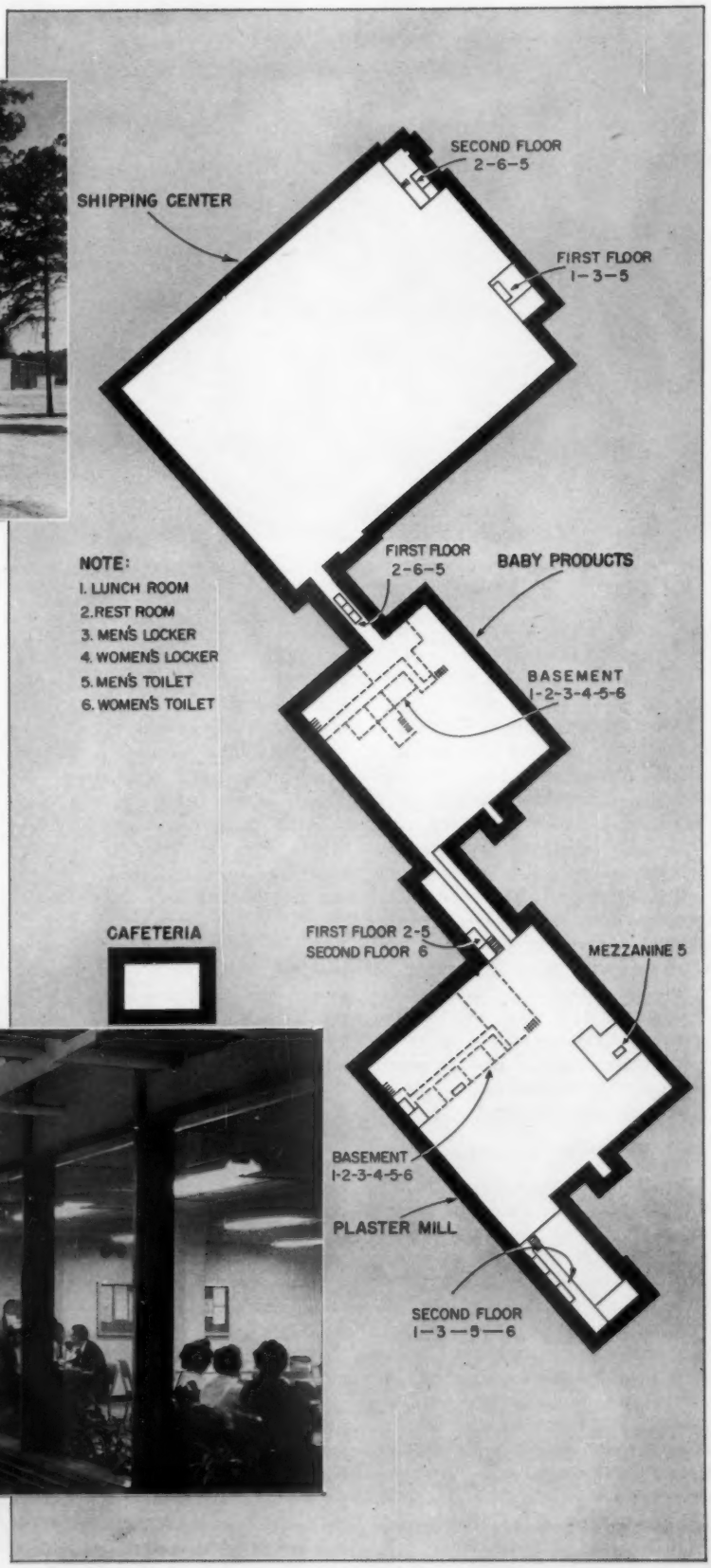


Fig. 4. Plot plan sketch shows relative positions of lunch room, rest room, toilet and locker facilities provided for J&J workers. Considerable effort was expended to furnish worker comfort facilities, convenient to work stations

Fig. 3. One of two basement lunch rooms provided in manufacturing areas

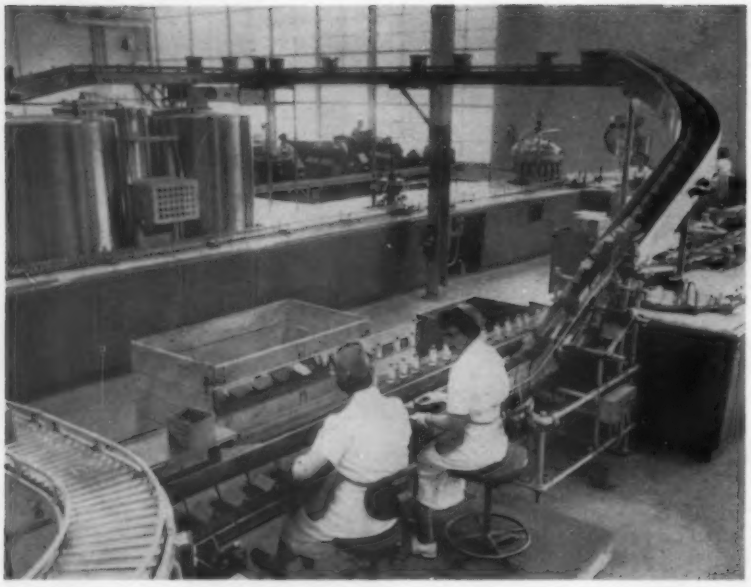


Fig. 5. Here, in baby products manufacturing building, is typical example of the "goods moving to the people", on conveyors, lessening personnel fatigue

only extra expense would be time, and time was not a factor; the dragline trucks would be unattended, moving at a constant rate of speed.

An immediate consideration in any separate building plan was personnel, for whom a long, multiple-building arrangement might mean increased traveling distances. But studies showed that it was not people, but things—goods on conveyors—that traveled the longer distances. People stayed at relatively fixed positions. Travel to and from the cafeteria was no further than it would have been in a large single building, and it was felt that the separate location of the cafeteria was an advantage—a walk in pleasant, colorful surroundings would be a welcome break in the day.

Design for Expansion

Separate buildings solved the additional personnel problems of autonomy and scale, but careful planning was still necessary to assure expansion potential and efficient materials handling. Stores were divided and placed near the operations they served. Separate rail spurs were provided at each building. As a final step, the buildings were arranged diagonally on the site to accommodate the spurs and to take their logical positions on the plant conveyor.

Investigation of the final consideration — cost — showed that there was almost no difference in single- or multiple-building arrangement. Outside walls were much longer, but inside fire walls were virtually eliminated. Since there was little cost differential between inside fire walls and exterior walls, there was little to choose either way.

Final plant design by J & J and Kidde engineers consists of three main buildings, arranged step-fashion on the site and connected by smaller office-and-laboratory buildings. A cafeteria and conference building is located a short distance away, near the main buildings but out of the path of future expansion. Provision has been made for the addition of a main office building to the cafeteria at a later date. A 5000-ft service road circles the plant, entering on each of the manufacturing buildings and the cafeteria. A 375-car parking lot is located near the cafeteria and manufacturing buildings. Provision has been made for completely landscaping the site, and a large decorative pool has been placed on the site near the main buildings.

In the color, architectural treatment of the buildings, building arrangement and landscaping, personnel morale and pride in the company were important considerations. The buildings are in general single-story structures, structural steel frame with concrete block exterior walls finished in white stucco. Portions of the plaster mill use a window wall of blue porcelain enamel, and office area exteriors are red face brick. Blue cover plates of porcelain enamel steel cover wall columns and facia girders of the buildings, both for color and wear resistance, and all three main buildings contain large wall areas of blue glass, arranged vertically and horizontally.

Design of Fenestration

The fenestration of each building was studied intensively, since maximum natural daylight was a requirement both for illumination and to provide cheerful operating conditions. After a study of solar tables, northern exposures were designed with large areas of blue glass. East and west walls have blue glass placed in ribbons, either horizontally or vertically along columns. South exposures, where sun is strongest, have ribbon windows under the eaves. An example of the attention paid to fenestration is window treatment of the shipping center, where palletized storage will be stacked to within a few feet of roof steel. Horizontal blue glass ribbons have been kept high under the eaves on this building to allow natural light to penetrate inside the 285,000-sq ft building to its maximum extent.

Plant Lighting

Within the buildings, the same attention was paid to operating conditions. Interior walls of the manufacturing buildings were painted in light tones. Skylight monitors of clear plastic were incorporated in the roofs to supplement natural light from the windows. Extensive high-amperage lighting—using 800-milliampere lamps — was employed in manufacturing and shipping areas. The number of lights per bay was varied to assure that each operation received the desired illumination. Controls were placed at centralized panels, with 277-volt switches for local control.

During the design of intraplant travel routes, people were again an important consideration of the J&J-Kidde planning team. Here, though, the problem was functional. Design had been based on keeping intraplant travel to a minimum, and personnel routes and services within the manufacturing buildings placed with an eye to efficiency and expansion.

(Continued on page 266)

A Plant Engineering Editor's Report

What's Ahead in Lighting?

By VERNON T. KEMPF, Electrical Editor, Plant Engineering

TOP LIGHTING ENGINEERS throughout the country gather together once a year at their national technical conference to discuss the advances made in lighting during the year. These members of the Illuminating Engineering Society are all engaged in promoting the use of better, more comfortable lighting through fundamental research and applications.

It generally takes about one year for the new ideas presented at these conferences to take root and grow into useful applications. To keep you among the best informed readers in the industry we are presenting the following highlights of this year's conference held at Atlanta, Georgia, during the week of September 9 to 13.

You will read about the new, smaller, more efficient 100-watt incandescent lamp that will permit you to get more light out of existing fixtures now using smaller lamps. Industrial lighting installations with very high footcandle levels are discussed. One installation in an experimental workshop has 1000 ft-c. A large production machine shop with a low bay lighting installation has 150 ft-c. A high bay lighting job using several thousand lamps provides 60 to 70 ft-c.

A single 1000 watt color improved mercury lamp was used above a plastic ceiling to illuminate a small office. This one lamp does the job of many fixtures at a substantial reduction in costs. Office lighting up to 450 ft-c is discussed. Visitors selecting variable levels of lighting generally choose between 200 and 300 ft-c.

Lighting loads of 20 to 40 watts per square ft are discussed and may become common in the next ten years. If you will mentally multiply your square feet of office space by 20 it will give you some indication of your power problems in the future. Along with these higher load problems will come the problem of heat dissipation in air conditioned areas. One suggestion is to cool the fixture directly and take the heat away before it enters the room. Some of these areas require no heating as the radiant heat from the lighting system provides ample heat.

As lighting takes up more and more of the ceiling area there is less room for the conventional acoustic treatment required to suppress noise. More attention to the problems of sound transmission in luminous ceiling installations will face the plant engineer. Here are some of these highlights in greater detail.

Smaller, More Efficient 100-Watt Incandescent Lamp — Mr. P. B. Jordan of the General Electric Company presented a paper on improvements to their line of 100-watt lamps. The present general service lamps have a coiled-coil, CC6, filament mounted across the axis of the A21 lamp. By relocating the filament along the lamp axis, the pattern of filament radiation and filling gas convection currents become so altered as to produce six per cent greater mean light output and 11 F lower socket temperature in the same bulb size.

Because of this improvement in efficiency and reduction in socket temperature the bulb size of the 100-watt lamp has been reduced to A19. The new lamp will be the same size as the present 50, 60 and 75-watt lamps.

The gain in efficiency of the axial filament lamp is made at some expense of life on horizontal burning. However, as surveys show the preponderant use of the 100-watt lamp in a vertical position, the new construction provides these advantages in the most prevalent conditions of service.

Industrial Lighting up to 1000 Footcandles—*Power-Groove fluorescent lamps are used to produce a general lighting level of more than 1000 ft-c with only 35 watts per sq ft in a workshop at G-E's Lighting Institute at Nela Park.*

This system utilizes 27 two-lamp fixtures made of anodized aluminum which are mounted edge to edge. The fixture gives 35 degree shielding and over 25 per cent upward light component. In this case the openings in the top serve to take the heated air away and keep the work area comfortable. A new type of wedge-shaped cross louver reduces the fixture brightness even when viewed lengthwise. Fixture weight is reduced to a minimum by the use of a 400 cycle system.

Other high level power-groove industrial lighting installations are covered in this paper presented by G. R. Baumgartner, A. T. Dorsey and E. A. Linsday all of the Large Lamp Department, General Electric Company, Nela Park.

A large production machine shop with a low bay lighting system was described. This installation has continuous rows of two lamp fixtures on ten ft centers and produces 150 ft-c.

A high bay lighting installation in an automotive plant uses several thousand lamps to provide illumination levels of 60 to 70 ft-c.

The authors state that lighting in the past has generally been used to dispel darkness as compared to the ultimate objective of equalling or improving daylighting conditions of the 5000 to 10,000 ft-c level.

Mercury Lamps Move Into the Office — A further improvement to the color rendition of the fluorescent mercury lamp is made by the application of a "purple lustre". This is actually a colloidal metallic coating which must be applied to the bulb and fired at high temperature.

The author, W. S. Till, Westinghouse Lamp Division, Bloomfield, N. J., described several interesting applications and demonstrated the color rendition of the new lamp. Effects of regular mercury, color-improved mercury, cool white fluorescent and warm white fluorescent in relation to the new deluxe fluorescent mercury lamp were shown.

A single 1000-watt mercury lamp

with these color properties was used above plastic panels to illuminate a small office. It was reported that color rendition as seen in this office was completely satisfactory. The ceilings and sides of the plenum are painted white while the walls of the office are of a peach color.

Light green is a popular color for offices since it makes people look better by affording contrast, but when the light source itself is predominantly green, there is less contrast.

The advantages of de luxe fluorescent mercury lamps in office lighting is simply that there are fewer fixtures to install and maintain.

Light output of the new lamps is 75 to 80 per cent of the regular fluorescent mercury lamps and color is close to that of cool white fluorescent lamps.

Experience with 450 Ft-c Office Lighting—*There is a wide gap between the levels of illumination which laboratory tests indicate as desirable for office tasks and those which are currently being installed. Although there is a gradual increase in accepted footcandle levels, it is a footcandle-by-footcandle approach toward these higher levels rather than a full scale movement. Yet, when reading, we naturally take advantage of those higher levels at windows, under skylights and in the shade of a porch.*

It is obvious that installation and operating costs influence the choice of footcandle levels of illumination. Aside from economics, however, there are equally important questions as to whether we know how to design high levels that are visually comfortable, and whether we have suitable luminaires and application techniques to produce them. Are brightness and brightness relationships recommended for 50 to 100 ft-c installations applicable also to those in the 100 to 500 ft-c range?

The authors, Mr. J. M. Ketch and Mr. W. S. Fisher of the General Electric Company designed an office installation to explore these higher illumination levels. Two-lamp etched aluminum troffers 12 in. wide were installed side by side in a room 14 ft by 18 ft. Forty-eight fixtures were installed in this area measuring 252 sq ft.

Forty-watt rapid start lamps were employed operated on a thyratron dimming circuit to permit any lighting level between full blackout and full intensity. It is interesting to note that the occupants always use the full level for their day-to-day work. The dimming feature is used only for demonstration and experimental work.

Visitors are asked to sit at a desk, look at any of several visual tasks, and adjust the dimming control knob to a level they would like to have. This is not a reliable criterion of what is right or desirable for any seeing job, but it is of interest to note that a great many select levels between 200 and 300 ft-c. A few have felt that they would like more than the maximum provided. No one has ever selected less than 100 ft-c.

The lighting load averages 21 watts per sq ft. During cold weather it has not been necessary to use supplementary heating in the office. One can visualize buildings of the future where a lighting system is the principal source of heat as well as light. Although the lighting load affects the design of most present-day heating and air conditioning systems, it should be much more prominent in the designs of the future when lighting levels have advanced closer to the optimum.

The Problem of Heat From Fluorescent Fixtures in Air Cooled Rooms—For many years the universal method of cooling rooms and buildings for comfort during the summer months has been to introduce cool air through an air distribution system. The co-authors, Mr. Walter Sturrock, General Electric Company, and Mr. Lester F. Schutrum, American Society of Heating and Air Conditioning Engineers, talked about other schemes that have been used which included panel cooling and cold water circulating systems. It has always been recognized that the energy load required for electric lighting is a heat factor which must be considered in designing these cooling systems.

Many fluorescent lighting systems employ luminaires of the open bottom or direct type and tests indicate that about 42 per cent of the watts consumed by such units will be converted into radiant energy which includes about 9½ per cent in light. The remaining 58 per cent of the energy will be dissipated in convected heat.

When these direct types of luminaires are built into a ventilated ceiling with glass or plastic bottom plate or are installed above a ventilated false ceiling it seems evident that the low temperature radiation and convected heat transferred into the room will be considerably less than obtained from luminaires suspended below the ceiling.

It seems logical to conclude that fluorescent lighting systems of the so-called luminous ceiling design will have their energy most effectively dissipated if a cooling system either of circulating air or coils of cooling water can be installed above the ceiling in a manner to remove heat before it enters the room. In fact, this is a necessity when the Btu from lighting is a major portion of the total heat and when the lighting load is so high in watts per square ft that the room cannot be comfortably cooled with a normal amount of circulating air.

Acoustics and Lighting — *The growing importance of extended area lighting systems and the trend toward higher illumination levels at lower ceiling heights using recessed or surface mounted luminaires has made it necessary for the plant engineer to have a good understanding of acoustics in order to promote good lighting.*

Mr. George Clark of Sylvania Electric Products Inc., stated that until recently, the major acoustical concern of lighting was the problem of noisy ballasts. Here for the first time, the average plant engineer was faced with the term "decibel". Without knowing exactly what a decibel is or how to apply it he can use the ballast manufacturers ratings as a guide in the selection of appropriate interior equipment.

This early experience with the decibel was his first attempt at sound control and an introduction to acoustics.

When luminous ceilings take up the entire area normally reserved for acoustical treatment the plant engineer must be prepared to talk intelligently to acoustical engineers about the problems of sound transmission to justify his lighting recommendation. He must have sufficient knowledge of architectural acoustics to avoid unnecessary compromise of the benefits of good lighting, yet be able to recognize the importance of a proper acoustical environment. **End**

Can These Ideas on Hydraulics Help You?

Author Suggests Various Industrial Applications

Would a remote control valve system help one of your plant operations? . . . Possibly self contained hydraulic systems may be the answer . . . Some applications of such a system could be controlling hazardous chemical processes, opening and closing windows, weighing operations

By **WILLIAM GUMMERE, JR.**, Chemical Engineer

CONVENTIONAL TYPES of industrial hydraulic applications are well-known. There are, however, some theoretical applications for hydraulics, which have never been fully exploited. It is those applications which we will discuss in this article.

When we speak of conventional hydraulic systems, we naturally think of a steam or electrically driven pump, an accumulator, control valves, etc. However, it is perfectly possible to have what we will refer to in the remainder of this article as a self-contained hydraulic system.

Before the actual discussion of suggested applications for hydraulics is presented it may be well to review briefly the basic principles of hydraulics. For this purpose, the following study of a hypothetical system is presented. In this system, there are cylinders and pistons, with areas and maximum length of strokes as stated, lifting-weights as given, all inter-connected as shown in Fig. 1.

The entire system is filled with hydraulic fluid. Piston A is in a raised position, and pistons B, C, and D, in a lowered position, with weights placed above the pistons. In order to simplify the explanation, friction, weights of the various pistons, and of the hydraulic fluid have been neglected.

When a force of 10 lb is applied to A, it will effect a system pressure of 10 psi. This pressure will be transmitted to all of the pistons in the system, and the actual force exerted on each piston will be directly proportional to the area of the piston. Thus, in C and D, a total force of 10 lb each will be exerted, obviously not enough to lift the 20-lb and 30-lb weights. However, in B, with an area of 10 sq in., a total force of 100 lb will be developed, putting the 100-lb weight in equilibrium with the 10-lb weight. If the force on A is then increased sufficiently to force A down 10 in., 10 cu in. of fluid will be displaced, which will raise B a total distance of one inch, the maximum length of B's stroke.

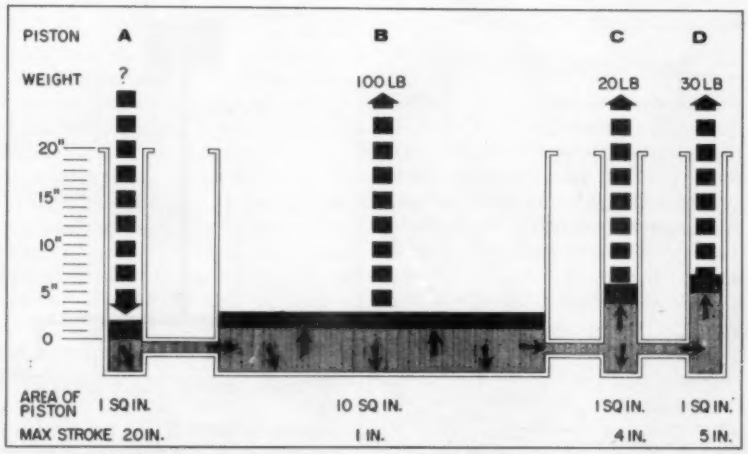


Fig. 1. For purposes of discussion, piston A is in a raised position, pistons B, C, and D in lowered positions, with weights placed above the pistons. To simplify problem, friction, weights of pistons and hydraulic fluid have been neglected

If A Weighs 20 lb

Next, if the weight on A is 20 lb, the pressure in the system will be increased to 20 psi, putting C in equilibrium with A. If A is forced down another 4 in., C will be raised 4 in., the maximum length of C's stroke. A total of 14 cu in. of fluid from A will have been used leaving 6 cu in. on the basis of the total stroke of 20 in. and the area of one square inch. If the load on A is increased to 30 lb, the pressure in the system will be increased to 30 psi. If the piston A is forced down for a distance of 5 in. by additional force, 5 cu in. will be displaced, and this displacement will cause piston D to be raised 5 in.

Next, assume that the load on A has been increased to bring about a system pressure of 50 psi. The three other pistons — B, C, and D — each have been lifted as far as they can go, and since liquids are not compressible, A will remain in the same position that it was after the 30-lb weight was lifted, namely one inch above the bottom of the cylinder.

Increasing the load on piston D to 60 lb will increase the pressure in the system to 60 psi, and will raise the 50-lb load on A. Piston A will be raised a total of 5 in., inasmuch as with the 60 lb load, D will drop 5 in. During this time pistons B and C will remain in their elevated positions.

Perhaps more can be done with the idea of self-contained systems

which operate generally along the lines of the foregoing weight raising setup. Here are some suggestions on how a plant engineer can devise such a system to take care of possible plant problems.

A good illustration of self-contained hydraulic systems is to be found in the hydraulic brake systems, with which the vast majority of our motor-vehicles are equipped. In such a system, the driver presses on the brake pedal, which in turn moves the piston of the master cylinder. The master cylinder applies pressure to the hydraulic fluid which is transmitted to the various wheel cylinders. They, in turn, move the brake shoes so that the lining makes contact with the brake drums.

Hypothetical Installation

Figure 2 shows a hypothetical installation, which could be used in place of typical push-pull controls, or it could be used for operating a pair of valves. Operating diaphragm A is used to control the system. This is connected to diaphragms B and C. It is to be noted that B has a weak spring, while C has a strong spring.

Consider what happens when pressure is applied to the system by tightening the handwheel on A. This moves a volume of fluid into the tubing, and, in turn, into the two chambers B and C. B, having the weaker spring, will operate first, the hydraulic pressure opposing the action of the weak spring, and causing the stem to move in the direction shown by the arrow.

Sequence of Operations

When B has moved as far as it can go, any further turning of the handwheel will then further increase the pressure in the system until it is great enough to offset the force of the strong spring on diaphragm C. The pressure will then close the valve to which the latter diaphragm is attached. When the pressure in the system is reduced, C will open first, followed by B. Every time that the system is operated, the same sequence will be followed.

For a practical application, assume that you have an agitator in which two chemicals are being mixed. You could equip the outlet valve with a diaphragm, such as at B, and the two inlet valves with diaphragms such as at C. Turning the handwheel would close the outlet valve. Further turning of the handwheel would then open the two inlet valves. When the agitator has been filled, the feeding of materials could be stopped by merely reducing the pressure in the hydraulic control system. After the mixing has been completed, pressure could be reduced further, thereby opening the outlet valve.

In other words, there would be but a single control for all three valves. Furthermore, the valves for inlet of raw materials could not be opened accidentally unless the outlet valve were closed first. Thus, such a system would operate the valves in the proper sequence.

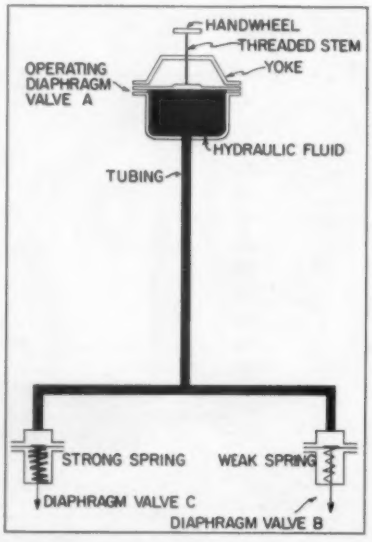


Fig. 2. This suggested method could be used to operate two or more valves

With further reference to valves for remote control operation, Figs. 3 and 4 show two types of valves which utilize only a diaphragm and no packing. Figure 3 is self-opening, and Fig. 4 is self-closing. When hydraulic pressure is created in the diaphragm chamber, the valve shown in Fig. 3 will close, while that shown in Fig. 4 will open.

There are a number of possible applications for valves of the types shown in Figs. 3 and 4, or a conventional valve equipped with a spring and diaphragm, as described previously. Valves operated by this means could be used wherever it is desired to operate several valves in a definite sequence, or whenever several valves must be opened or closed together.

There may be installations where, for one reason or another, it is difficult to justify conventional remote control valve equipment, but where remote control of valves might be an asset in the operation of a plant. There may also be installations where it is desired to utilize remote control, but to be independent of any external source for power, such as electricity or compressed air. In such installations, self-contained hydraulic systems might very well be the answer.

Going one step further, it would also be possible to develop systems in which double acting diaphragms and diaphragm chambers are utilized. Such systems might be required when there is a variation in the sequence of operations. For example, there may be an installation in which a valve which closes first, also opens first. In such a case, the double acting diaphragm could be utilized. However, the likelihood of a case of this type would be rather remote.

There are other types of applications for such remote-control valve systems. For example, assume that you have a very hazardous chemical process plant. This particular process is such that too high a pressure, too high a temperature, or shock could start fires or explosions.

Controls for Emergency

It is desired, in the event of an emergency, to perform the following operations: stop the flow of steam to the process, stop the flow of raw materials to the process vessels, vent certain pieces of equipment to reduce the pressure within them, dump the contents of other pieces of equipment, turn on sprinklers in certain areas as a precaution, divert all water from other lines to the sprinkler and fire lines. To perform such operations in time, by hand, would be an extremely difficult job. To perform it by conventional kinds of automatically operated valves, may be expensive. However, this type of operation could very readily be performed by an hydraulically-controlled system.

It would merely take a system of valves, located at appropriate places in the lines. These valves should be either self-opening or self-closing as required. The valve controlling diaphragms would all be connected to a common control diaphragm, and as long as pressure was maintained

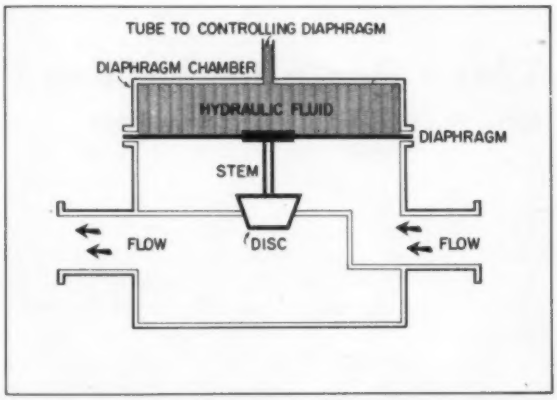


Fig. 3. Details of self-opening valve. When hydraulic pressure drops, reducing fluid in chamber, valve will open

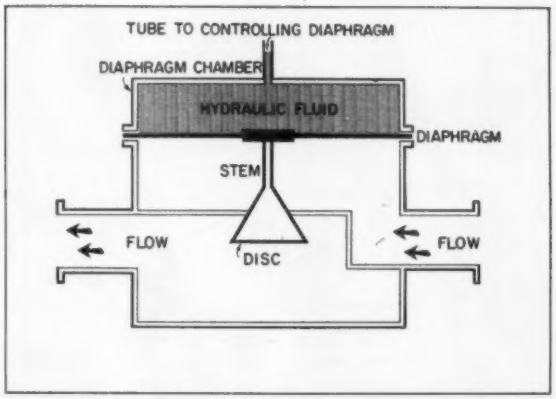


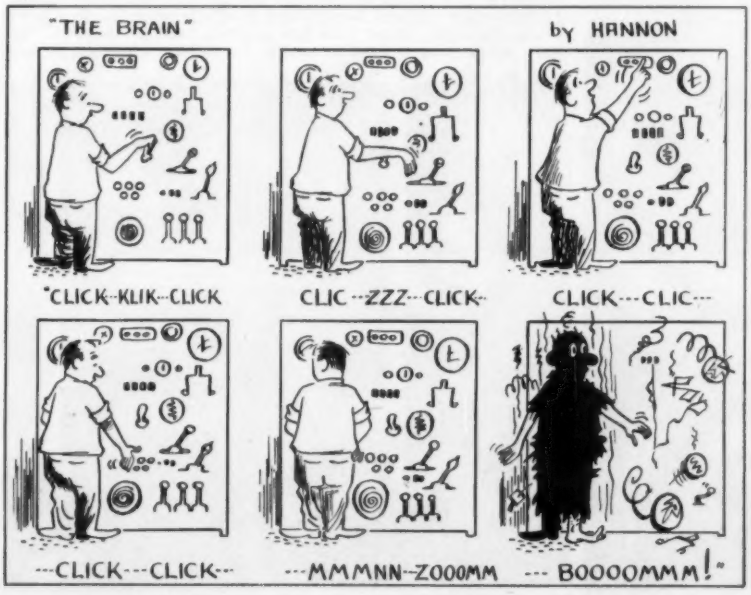
Fig. 4. Details of self-closing valve. When hydraulic pressure drops, reducing fluid in chamber, valve will close

in the diaphragm, the valves would remain open or closed as desired, for normal operation. Connected to each main control diaphragm, would be fusible plugs, of various thermal ranges, depending upon their location. There also would be pressure actuated valves, which would open if the pressure in a vessel got too high.

Other Applications

Self-contained hydraulic systems could also be used to perform many of the functions presently utilizing push-pull controls. Such systems could be used for performing certain operations which are not practical with the typical push-pull control system. For example, self-contained hydraulic systems could be used for opening and closing windows and doors. This would be specifically applicable to overhead windows, such as those in monitors, skylights, etc. Many such installations would be simpler than utilizing the conventional operating methods. In such installations, the weight of the window itself, could be used to close it. A small hydraulic cylinder could be used to open it. This is but one example of the type of service which could be rendered by self-contained hydraulic systems.

In many functions of this type, it would be advisable to use a lever to apply force to the operating diaphragm, instead of a handwheel. This may be especially adaptable in the case of push-pull type systems, but would also be applicable in some valve operation systems.



There are other types of systems which could be developed, using self-contained hydraulic systems. For example, hydraulic pressure can be used, in certain weighing operations. It would be possible to go one step further, and to actually perform certain control operations, utilizing the weight to actuate hydraulic control systems.

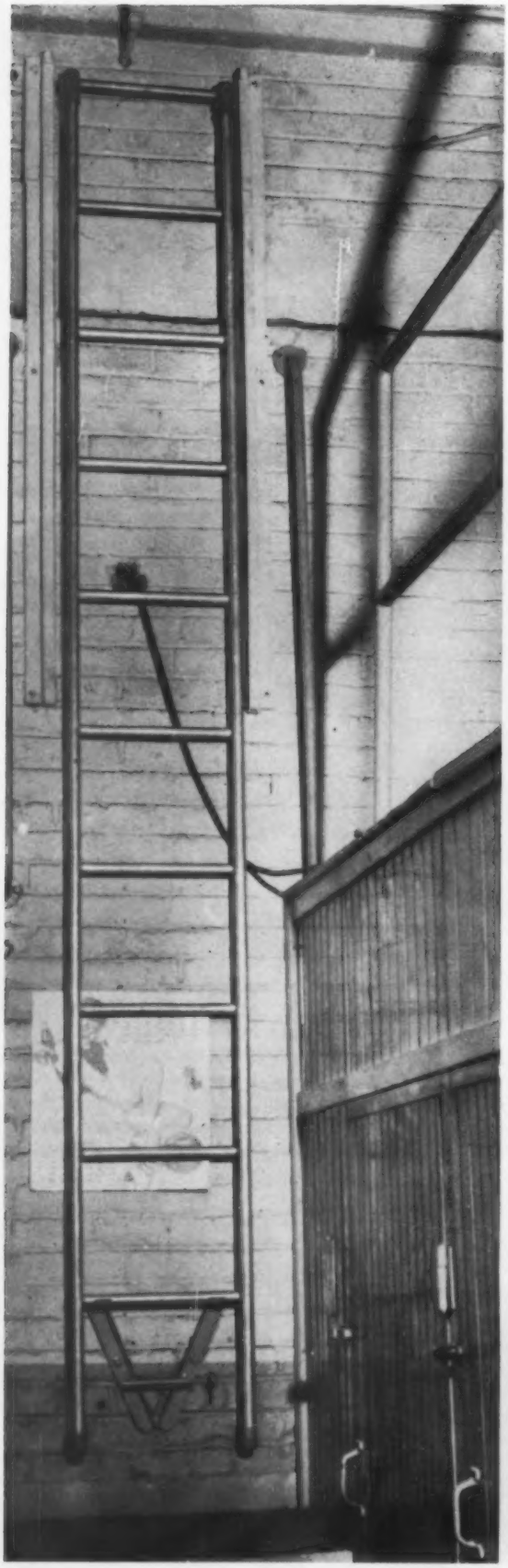
Control of Truck Loadings

It would also be possible to control the loading of dump-trucks by means of hydraulic pressure. Thus, when a truck backs onto a platform, beneath a bin, its weight would create sufficient hydraulic pressure to open the bin for gravel, coal, etc. Then as the truck is filled, the same hydraulic pressure could be utilized to stop the flow of material, when the maximum gross weight is reached.

It would also be possible to devise systems to weigh loads on fork trucks, by means of hydraulic pressure, and to guard against overloads by stopping the lifting if the load is too heavy.

These are just a few illustrations of where hydraulic pressure could be used to control weights. Conveyor scales could be devised, using the same principle.

Before concluding the discussion of remote-control valve systems, it should be pointed out that hydraulic pistons and cylinders, or rams could be used in place of diaphragms. Also, in the case of diaphragms, where an appreciable length of stroke is required, a bellows-type diaphragm could be used, giving a greater length of stroke to the diaphragm. **End**

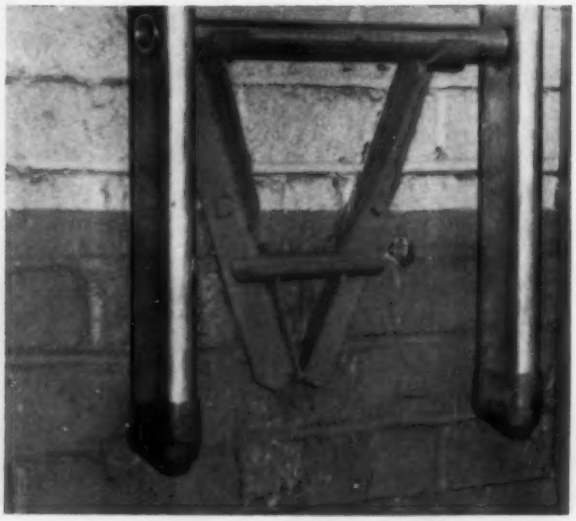


Fixed Portable Ladder

Safe Stairway in Tight Quarters

LLOYD MCWILLIAMS, engineer with Shawinigan Water & Power Co. in Quebec, has called our attention to this space-saving and safe ladder installation in his plant. It was necessary, occasionally, to reach a balcony to the right of the ladder shown. The only access was hazardous for an ordinary portable ladder. Ingenuity, channel iron and angle iron made access as safe and foolproof as possible. **End**

The three photos on this page tell the story of a problem solved successfully at Shawinigan Water & Power Co. in Quebec. At the left is an overall view of the ladder. Art work in back of ladder was not a part of safety campaign. Picture above shows how ladder moved freely up and down along channels. Hand rails are securely fastened to wall. Below: Angle iron is used as socket for ladder when not in use



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Specify Rome's Synthinol 901 for your next job. Contact your nearest Rome Cable representative for more information–or write to Dept. 321, Rome Cable Corporation, Rome, N. Y.

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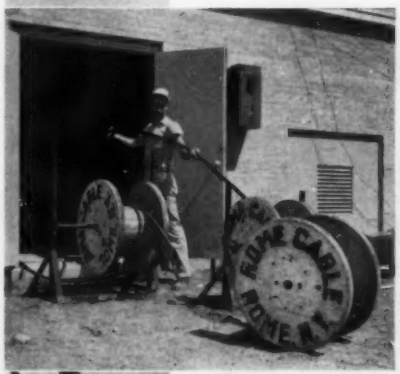

UNDERGROUND OR OVERHEAD. Power cable leaves reels for underground installation to pole. It's also ideal for overhead use.

EASY TO PULL. This Crain Electric Company workman guides Rome's high-voltage power cable into conduit at the start of a 250-foot pull from Amarillo's new Olsen Park school.

LONG CABLE LIFE. Crain's crew prepares to make the overhead service connection. Because this tough power cable is highly resistant to abrasion, moisture, and weathering, long cable life is assured.

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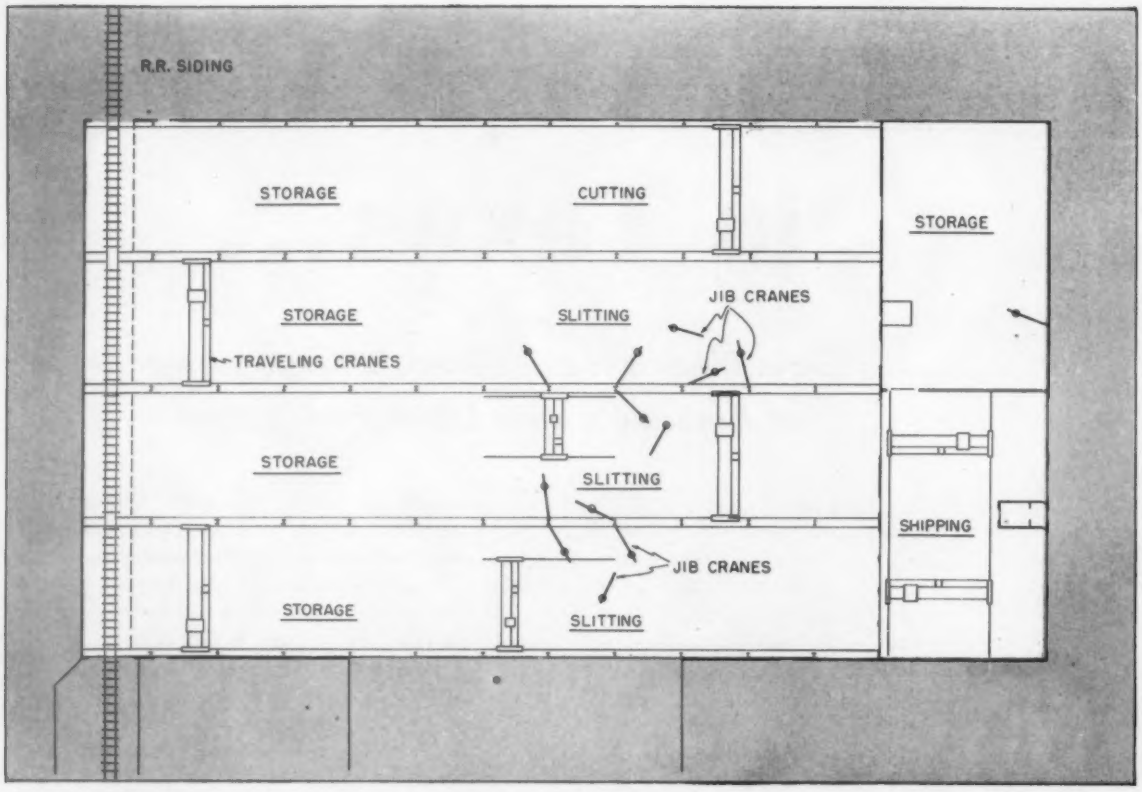


Fig. 1. Diagram shows coverage of warehouse by 21 cranes of various types and capacities for handling steel rolls

21 Cranes—Each Tailored to Its Job

System Provides Smooth Flow of Steel Through Warehouse

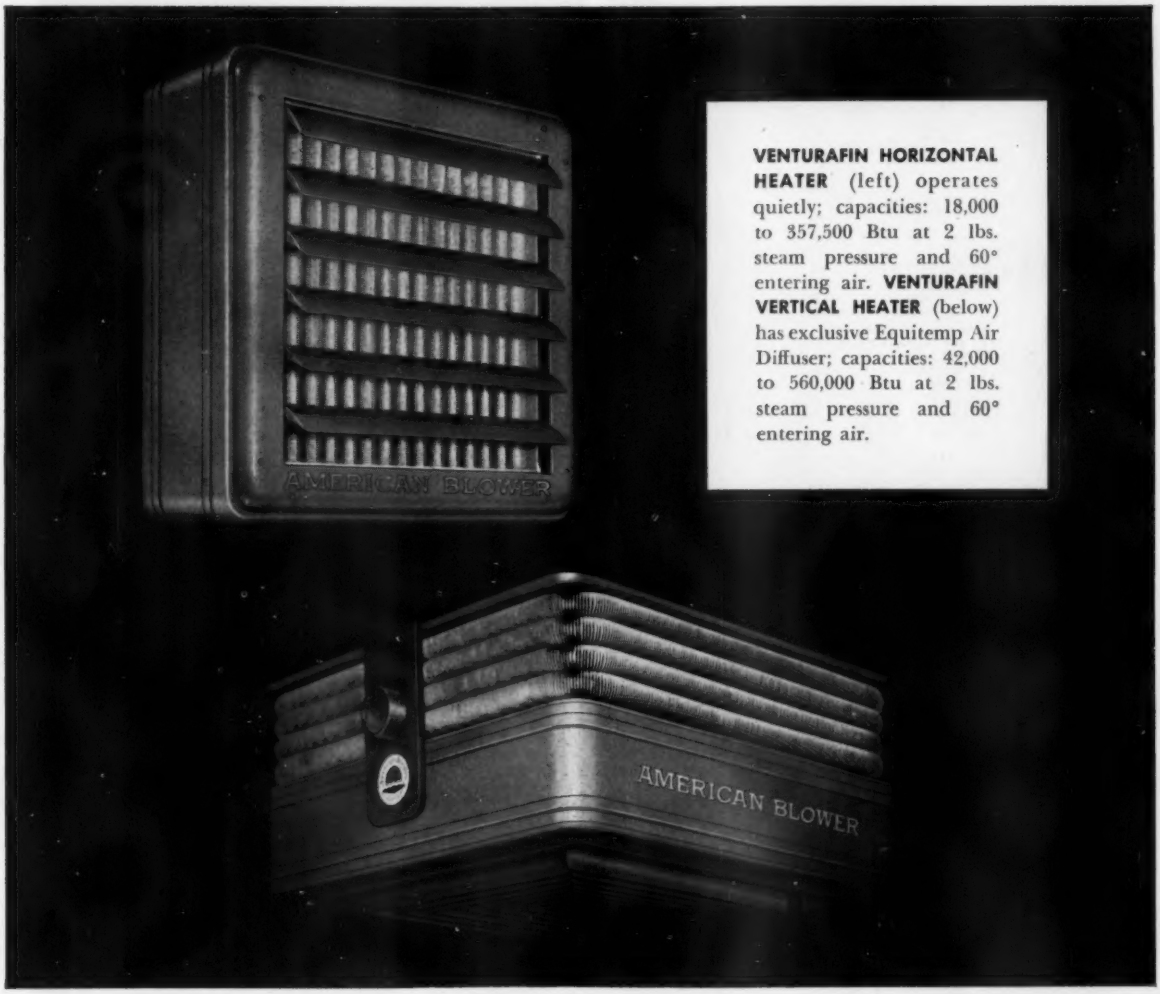
TWENTY-ONE CRANES of various types and capacities were installed in the new building of Precision Steel Warehouse, Inc. in Franklin Park, Ill. to provide a smooth flow of materials with a minimum expenditure of time and handling.

Type, capacity and span of each crane were determined for each handling operation by Precision Steel engineers in cooperation with Chicago Tramrail Corp.

Included in the types chosen were top running and underhung cranes, also single-leg gantry cranes, bracket type jib cranes and free standing jib cranes with 360 deg rotation. Each crane has its own floor-controlled, trolley-mounted electric hoist.

Complete coverage of the entire warehouse area, see Fig. 1, is provided from the receiving of carload

Fig. 2. Gantry is used to handle various sizes of rolls



VENTURAFIN HORIZONTAL HEATER (left) operates quietly; capacities: 18,000 to 357,500 Btu at 2 lbs. steam pressure and 60° entering air. **VENTURAFIN VERTICAL HEATER** (below) has exclusive Equitemp Air Diffuser; capacities: 42,000 to 560,000 Btu at 2 lbs. steam pressure and 60° entering air.

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Fig. 3. Each bay is served by 7½-ton, pushbutton control, overhead crane. All cranes operate length of building

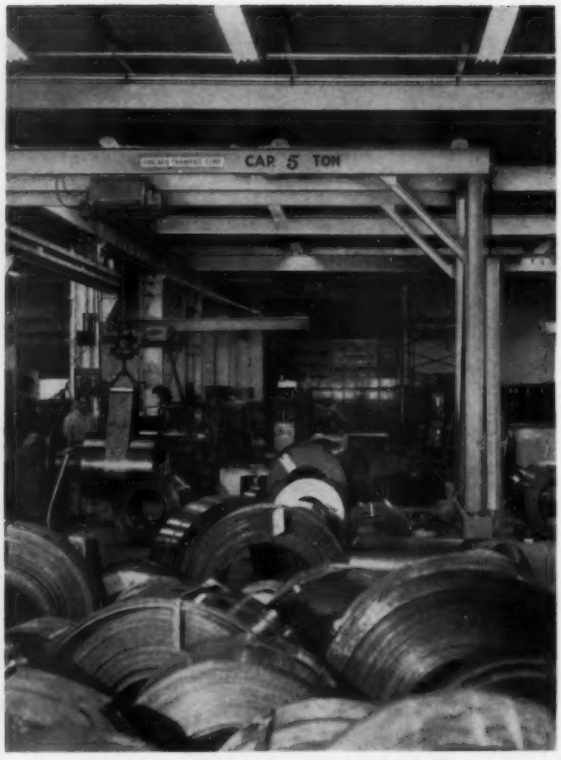

Fig. 4. Huge uncut mill coils are picked up by single-leg, 5-ton gantry cranes, which operate below overhead cranes

shipments of various types of steel in mill size coils weighing up to 10,000 lb each, to storage in designated areas, through processing to customer requirements and delivery for final shipment. By using cranes selected for each of these operations, the flow of materials is smooth and efficient without waiting time for crane service and without waste motion.

Original coils received from the mills enter the warehouse from the receiving dock which occupies the entire width of the south end of the building. A wide variety of low carbon strip steels, stainless and spring steels, copper base alloys and aluminum are stocked in many different types and tempers, and these must be segregated in different areas of the four bays into which the building is sectioned. Each bay is served by a 7½-ton overhead crane, see Fig. 3, by one-man, pendant pushbutton control. This crane operates over the entire length of the building, lifting the cumbersome steel coils from freight cars or motor trucks and transporting them to the proper location in the storage area north of and immediately adjoining the receiving dock.

Each coil is tagged with the physical and chemical data required for identification. Each section of each bay is marked by numbers painted on the rails to indicate the area in which the coil is to be stored. The crane bridge is also sectionalized and numbered for accurate location. It is therefore possible to place a coil in the exact position of the storage area designated, for example, by the number 7 on the runway and number 3 on the crane bridge. This enables the operator to select the exact type, finish, width, thickness, temper and Rockwell required without error or delay.

The overhead cranes in each bay are usually employed in transferring the heavy mill-size coils to the processing area in the central half of the building. Here the uncut mill coils are picked up by single leg, 5-ton gantry cranes, operating below the overhead cranes, and placed on the arbors of the slitting machines, see Fig. 4.

Specially built, mill type machines shear and stack the required widths in one automatic operation. Other machines are employed for edge filing, edge rolling, roller leveling and sheet shearing as may be required, and individual jib cranes located at these machines permit fast, accurate handling and placing of materials in smaller widths and sizes.

Mechanical banding machines gather the individual, processed pieces into convenient-size bundles which are tagged for customer delivery with name, address, quantity, size and technical data for transfer to the shipping dock at the north end of the building.

The shipping area is serviced by two 5-ton overhead, underhung cranes with 37-ft spans. Here, sunken loading docks are raised to truck endgate level by 21-ton truck lifts for fast, convenient handling of outgoing shipments, and the customer receives his order to his exact specifications of type, quality, size and length within the time limit specified.

The handling equipment employed at Precision Steel Warehouse, Inc. includes four overhead 7½-ton cranes with 48-ft spans; two overhead underhung 5-ton cranes with 37-ft spans; two single leg gantry cranes of 5-ton capacity with 32-ft and 23-ft spans; nine column bracket jib cranes of 4,000-lb capacity with 16-ft spans; and one column bracket crane of 2,000-lb capacity with a 12-ft span.

In addition, there are three self-supporting jib cranes with 360 deg rotation; one of 2-ton capacity with a 16-ft boom; and two of 1-ton capacity with 10-ft booms, making a total of 21 cranes to expedite the handling of various materials throughout the building. **End**

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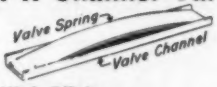

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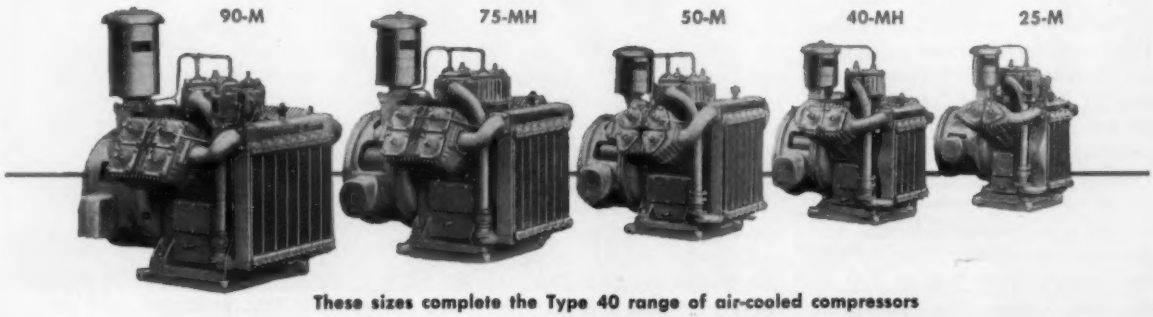

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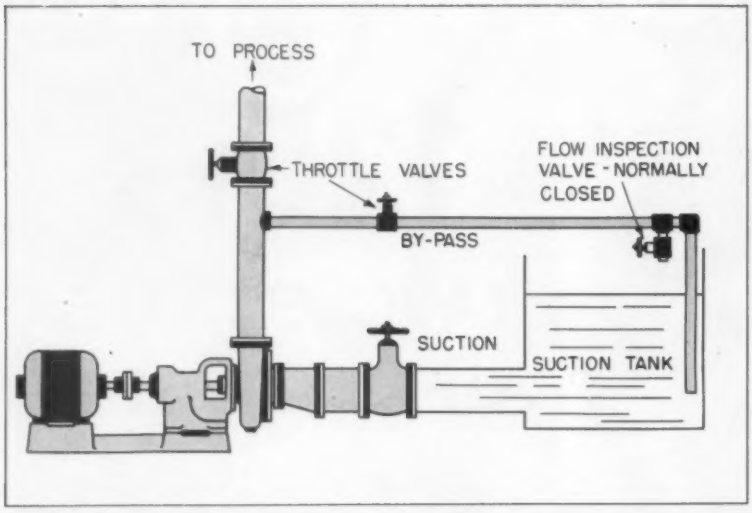


Fig. 1. Line drawing of system recommended for use with oversized pump throttled down. Bypass permits flow of pumped liquid at all times, to minimize heat

Centrifugal Pumps--

Careful Operation Adds to Their Lives

By E. SCHWANDT, Application Div., Goulds Pumps, Inc.

PROPERLY APPLIED and installed, a centrifugal pump is capable of many years of satisfactory operation. Occasionally considerable time and effort can be wasted in trying to correct normal operational problems; similarly, a simple change in piping or pump rating will often eliminate the need for repetitive repair. The following hints may help you to improve pump operation and reduce maintenance.

Pump bearing temperatures are frequently estimated by placing a hand lightly against the bearing housing or shell. If the bearing is "cool" or "warm" we feel assured. If it feels "hot" we may become concerned and spend considerable time and effort to reduce the temperature until the housing feels only "warm" without any clear idea of the actual operating temperature.

Unfortunately, the human hand is not an accurate thermometer and can give a danger signal falsely. The minimum temperature which feels "hot" varies from 120 to 130 F, depending upon the individual. Above this temperature the human hand is worthless in estimating temperature. Grease-lubricated ball and roller bearings can be operated at temperatures up to at least 200 F. In fact, the upper operating limit on anti-friction bearings is determined solely by the temperature at which the lubricant fails and begins to carburize. Bearing temperatures of 160 F are extremely safe. Operation of bearings at this temperature is not at all undesirable, as a better flow of lubricant can be expected. This gives a clearer idea of why a thermometer is needed to determine bearing temperature.

Bearing Heat Sources

All bearings operate at some temperature above that of the surrounding atmosphere, unless cooled. Heat is generated within the bearing due to rolling friction of the balls or rollers and by the drag of race. Some heat may be added by conduction along the pump shaft from the liquid within the pump and from external sources in close proximity.

The amount of heat which can be dissipated is dependent upon the cooling area of the bearing housing and the temperature and motion of the surrounding air. The net result is a stable operating temperature. Once this temperature has been established it will remain constant until one or more of the variables changes. No matter how hot it may feel to the human hand, high temperature, if it is stable, is not necessarily an indication of danger, so long as it does not exceed the upper limit of the lubricant. The normal temperature should be established accurately by thermometer and recorded in a convenient location.

A pronounced increase in temperature is an indication of danger and a signal to investigate. One shot of grease should be added to the bearing, but if this does not reduce the temperature immediately, no additional grease should be added. The unit should be checked for unnecessary load, such as coupling misalignment, or improper packing adjustment.

However, a temperature increase may not be an indication of impending bearing failure or excessive load. It could be due entirely to an increase in temperature of the liquid being pumped, or to an increase in the surrounding temperature during the warm summer months.

Bearing temperatures are frequently increased by lubrication practices. Excessive or over-greasing which completely packs the bearing shell with grease greatly increases resistance to rotation and increases the amount of heat generated. Most pumps handling hot liquids are equipped with quenching glands and water cooled bearings. High temperature greases should not be used with water cooled bearings as poor grease fluidity and inadequate lubrication may likely result.

Occasionally when pumps are first started, bearings run extremely hot. This high temperature is frequently caused by the grease seal, not the bearing. As soon as the seals are seated, the temperature will drop to a normal level.

Don't operate a centrifugal pump continuously near shutoff or zero capacity—this shortens the life of the pump and increases down-time.

The difference between input horsepower and water horsepower is transferred to the liquid in the pump as heat. Thus, when only a small percentage of rated flow is allowed through the pump by throttling, the casing may be unable to radiate the heat generated, and the liquid in the pump may rise to a dangerously high temperature.

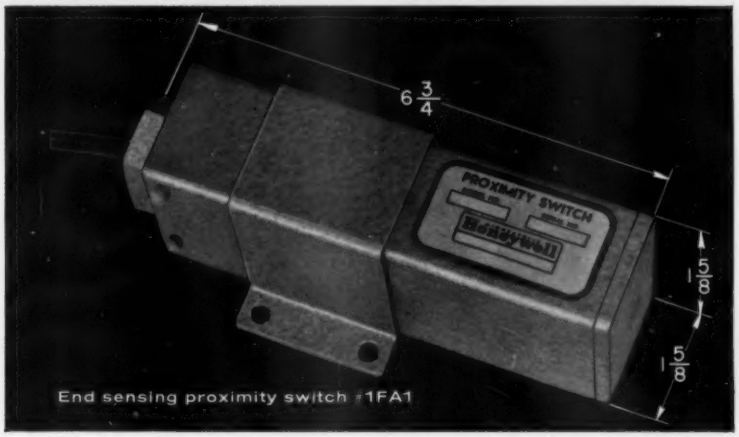
Hydraulic radial thrust is unbalanced when the pump is operating near shutoff, and this subjects the

MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

HONEYWELL

NEW!

The Honeywell Proximity Switch



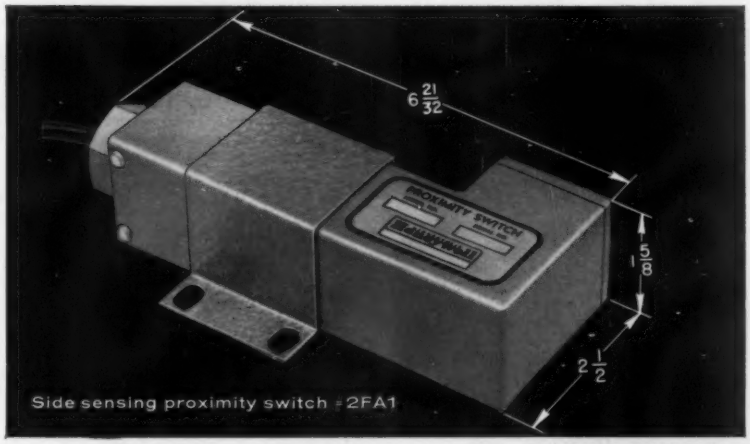
End sensing proximity switch #1FA1

Ideal limit switch on automatic machine tools—for use in materials handling control —for programming operation of transfer machines in automation equipment.

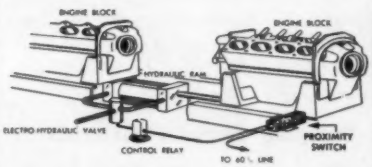
Consider these important features of this sensational magnetic switching device—

- **LONG LIFE**—No moving parts . . . no electrical contacts . . . no vacuum tubes.
- **HIGH SPEED OPERATION**—Will operate as many as 600 times a minute.
- **EXTREMELY SENSITIVE**—Can be operated by ferromagnetic surface as small as ¼ in. square and 1 in. long.
- **RESISTS ENVIRONMENT**—Relatively insensitive to ferrous chips . . . potted to permit operation in high humidity, corrosive atmosphere, or in presence of cutting oils . . . protected by heavy steel housing.

(*Request Data Sheet Nos. 119 and 130*)



Side sensing proximity switch #2FA1



Proximity switch used to activate an engine block transfer line

SPECIFICATIONS

EXCITATION
100-125 v, 60 cps, 2 watts (nominal).

OUTPUT
(a) switch "on"—12 vdc minimum into 250 ohm load; (b) switch "off"—4 vdc maximum into 250 ohm load.

SENSITIVITY
When a block of ferromagnetic material is moved parallel to and within ½ in. of its pole face, the Proximity Switch will operate the control relay.

REPEATABILITY
When a block of ferromagnetic material is moved parallel to and within ¼ in. of its pole face, the Proximity Switch will repeat its pick-up and drop-out point within 3/32 in.

DIFFERENTIAL
When a block of ferromagnetic material is moved parallel to and within ½ in. of its pole face, the Proximity Switch will have a differential distance between pickup and drop-out of less than 7/32 in.

Any MICRO SWITCH field engineer will be glad to work with you regarding the wide applications for this new Proximity Switch.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
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HONEYWELL

For more facts circle 569 on Reply Card

shaft to maximum deflection. The pump will be noisy, will vibrate excessively, and may break the shaft. Pumps are frequently rated for capacity sufficient to handle maximum requirements. They are also occasionally selected to handle capacities far in excess of present demands. This procedure will minimize ultimate plant investment, and avoid replacement with larger equipment at a future date. Regulating these oversize pumps for low flows will require excessive throttling of the discharge valve, resulting in severe punishment to the pump.

To relieve a throttled pump of undue strain, simply extend a bypass line from the pump discharge back to the source of supply. A throttle valve or an orifice plate should be placed in the bypass line, and sufficient flow returned to allow the pump to operate at a capacity reasonably near its rating. The bypass liquid should never be returned to the suction line immediately upstream from the pump, but should always be returned back to the source of supply and discharged below the liquid level to avoid air entrainment. See Fig. 1.

Pumping Abrasive Materials

When a pump is handling a liquid containing abrasive particles, some erosion of the impeller and other pump parts is expected, and a somewhat shorter life can be expected than if the pump were operated on a clear liquid. Whenever a pump handling a liquid containing abrasive particles is throttled to operate continuously near shutoff, erosion is greatly accelerated due to internal recirculation. This internal recirculation quickly erodes the impeller vane tips and the leakage clearances so that the impeller may be worthless after only a few weeks or months.

The proper solution to minimize erosion due to abrasives in a pump which is throttled is the same as above: install a bypass line allowing part of the flow to return to the source of supply. With properly designed suction tanks, the return flow can be utilized to agitate the liquid in the tanks, or supplement existing agitation facilities. In many cases the pump selected is deliberately over-size to provide sufficient by-pass capacity to insure adequate mixing. A midfeather in a suction tank is recommended to assure maximum velocity to minimize stratification and settling.

Practically every plant keeps records on its pumps and other equipment. Some are merely an inventory card listing pump size and manufacturer for accounting and insurance purposes; others are very complete on each individual pump and its driver.

Records with complete information, filed in an accessible location, can be invaluable in ordering repair parts, establishing lubrication and maintenance scheduling and in diagnosing pump failure.

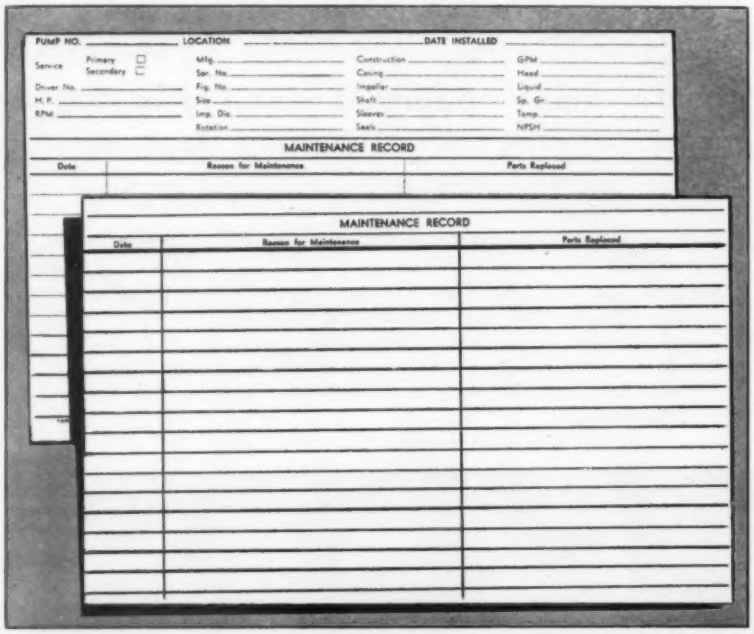
Pump cards should contain complete information including manufacturer's name, figure number, size, serial number, construction, material, rated capacity and head, driver horsepower, rpm and lubrication requirements. Sufficient space should also be provided for a brief notation of every failure or malfunction, the date and time it occurred and the repairs and parts required to return it to service. Pump suitability due to process changes could also be quickly determined.

Pumps also should be identified as to their importance to production. Colored tabs should be used to identify primary pumps which would stop production if they were to fail. Maintenance schedules on primary pumps should be established to minimize downtime.

A lubrication schedule should also be maintained in accordance with manufacturer's recommendations. Since most modern pumps have grease lubricated ball bearings which require lubrication every 2,000 hours, additional grease must be added only every three or four months. With this extended period, however, it becomes of prime importance that every pump be lubricated —especially sump pumps and others in inconspicuous locations.

Records of pump failure and the repairs required can be used to define the optimum period for any given pump before complete inspection and overhaul is required. If the pump record indicates that no failures have occurred over a period of years, a longer time between inspections would be warranted. On other pumps, the record may indicate frequent failure, suggesting frequent inspection. It should also flash a red warning light—something is wrong with the pump, either in its application, installation or operation. The chronological listing of failures will be invaluable in diagnosing the problem and effecting its cure.

Notation of pump repairs can also be used to determine proper spare parts inventory. **End**


PUMP NO. _____ LOCATION _____ DATE INSTALLED _____

Service Primary ☐ Secondary ☐ | Mfg. | Construction | GPM
Driver No. | Ser. No. | Casing | Head
H. P. | Fig. No. | Impeller | Liquid
RPM | Size | Shaft | Sp. Gr.
Imp. Dia. | Sleeves | Temp.
Rotation | Seals | NPSH

MAINTENANCE RECORD

Date	Reason for Maintenance	Parts Replaced

MAINTENANCE RECORD

Date	Reason for Maintenance	Parts Replaced

Fig. 2. Typical record card suggested for each pump, spare or active, in plant

Aluminum paint hides with one coat . . . gives a hard, durable, chemically-resistant finish. Penetrol-Aluminum Paint is a quality product of **The Flood Co.**, Hudson, Ohio.

PENETROL®-ALUMINUM PAINT MAKES WIRE FENCE PROTECTION EASY

"Years ago one of our industrial accounts specified Penetrol-Aluminum for fence painting . . . we were amazed to find it eliminated most of the usual problems. Since then we have used Penetrol on all our woven wire fence work," writes painting contractor Ray E. Hisey, president, Ray E. Hisey, Inc., Akron, Ohio.

For one thing, Penetrol flows so smoothly that vigorous brushing or rolling is unnecessary. Thus spattering is minimized, cleanup time is reduced. Even neglected fences, unsightly with rust, can be restored and maintained without regalvanizing. According to Mr. Hisey, Penetrol-Aluminum covers amazingly with one tough, weatherproof coat.

Made with ALCOA® Aluminum Pigments, a good aluminum paint like Penetrol is unmatched for durability. And the bright, silvery finish sets off any industrial property . . . stays "new" . . . looks prosperous for years.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for our two free booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable, up-to-date information. Use the coupon.

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I am interested in protecting _____
Name _____
Company _____
Address _____
City _____ Zone _____ State _____

For more facts circle 570 on Reply Card

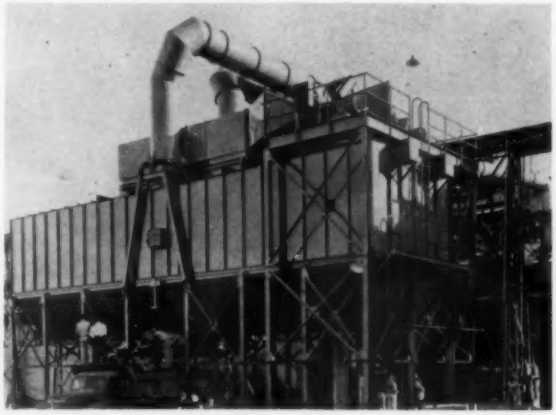
Air Pollution Control Gets a Boost with 75,000 Cfm Unit

OCCUPYING ITS OWN four-room-"building" and using 780 dacron bags, 15 ft long, a giant vacuum cleaner has been installed at the Torrance, Calif. plant of the National Supply Co.

Capable of moving 75,000 cfm of dust-laden air, the $125,000 system serves the electric melting furnace department of the plant. Ducts over each furnace carry all smoke from the melting operations to the dust collector baghouse, in each room of which are suspended 195 bags, six times in diameter, which filter out the dust in the smoke. Once each hour, these bags are shaken, to drop the collected dust into hoppers at the bottom of the bag rooms.

From the hopper, the dust is carried by conveyor to a discharge chute where it is mixed with water to form a sludge that can be hauled away for disposal.

The new system, engineered by the H. J. Horrell Co. and the plant's own engineering department, uses equipment supplied by the Dracco Corp., Cleveland, Ohio. A prime advantage of the system is that it provides sufficient capacity to permit the use of gaseous oxygen injection into the melting furnaces. This injection, which increases the efficiency of melting, was not possible with the dust-cleaning system formerly used at National.



Largest Aluminum Sand Casting Assembly Becomes Part of Wing Fabricating Table

FOUR ALUMINUM SAND CASTINGS, constituting the largest cast aluminum assembly ever produced, have been installed in the heavy machining department of North American Aviation, Inc., Columbus, Ohio.

Weighing more than 12½ tons, the sections were fabricated in sand foundries of Aluminum Company of America's Cleveland works to become part of a wing fabricating table. The table will hold a wing panel for precision milling.

All four parts of the chuck, when assembled, measure 28 ft in length, 130 in. at the widest point, and 16 in. deep. Heaviest of the sections weighs 7500 lb.

Formerly, equipment of this type was fabricated from ferrous alloys. Aluminum was specified because the chuck, as originally designed for ferrous metal, would have been too heavy for the foundation prepared for it.

Ease of machining was another reason for the change Machining aluminum parts costs about half as much as the same operation for steel parts. Alcoa's air blast quenching technique, which removes residual stresses, assures a dimensionally stable casting. Machining tolerances at the chuck surface are maintained to within plus or minus 0.002 in. in order to insure that the finished part is held to within plus or minus 0.005 in.

Six thermocouples, attached to a recording device, were placed at strategic points in each of the molds while hot metal was poured. By referring to readings from these instruments, the rate of cooling was studied to determine soundness of the part.

New Cold Finishing Plant Takes Steel Products Closer to Consumer

WITH RAW MATERIAL in the form of hot rolled bar stock shipped from Pittsburgh, Pa., a new cold finished bar mill has been placed in operation by Jones & Laughlin Steel Corp. in Willimantic, Conn. The new mill employs 60 to 70 persons, in its initial stage of operation.

Schumag continuous cold drawing machines are an important part of the processing equipment. Coils of hot rolled steel are fed into the machines, which draw, straighten, polish and cut to length in one continuous operation. J&L is one of the first American steel companies to use the new machine.

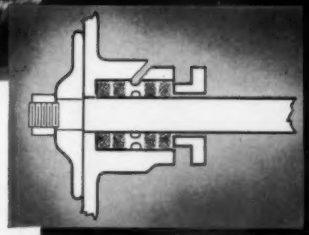
Built on a 31-acre site, the new building is a one-story, L-shaped structure, 535 ft long and 250 ft wide at the widest point of the L. Approximately 90,000 sq ft of production and office space are available to provide cold finished steel to New England customers.

MORE OF
THE GARLOCK 2,000

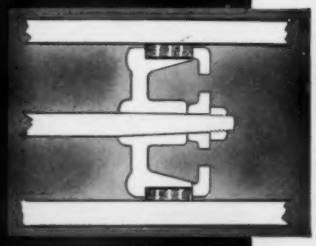
LATTICE-BRAID Packings of pure Teflon fiber for rotating shafts at high peripheral speeds . . . tough, chemically inert, yet resilient for positive sealing and cooler operation under extreme temperature and chemical exposure.

LATTICE-BRAID Asbestos Packing with Teflon impregnation, reduces friction, provides better seal with less gland pressure.

Wherever corrosion, contamination or torque is a problem on reciprocating applications or slow-turning valves CHEVRON† Packing made of Teflon is recommended.



Centrifugal pumps handling hot sulfuric acid and petroleum fractions leaked badly with ordinary packing. Also, new shaft sleeve required every few days. Teflon packing reduced leakage, and after several months service both packing and shaft were still in good condition.



Teflon packing rings on duplex pump handling 50% sodium hydroxide at 270°F. showed no sign of wear after 5 months. Formerly, packing lasted average of 30 days.

GARLOCK TEFLON*

Packings Reduce Process Shutdowns

Garlock LATTICE-BRAID† Packings of Teflon reduce maintenance, lower replacement costs, reduce wear on pistons and shafts, and increase productive capacity in countless pump applications where corrosive chemicals and severe operating conditions are encountered. The unique properties of Teflon (chemically inert, heat-resistant, low coefficient of friction, etc.) make it outstanding for use in chemical or petroleum process pump packings.

LATTICE-BRAID Packings of Teflon are another important part of "the Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals to meet all your needs. It's the only complete line. That's why you get *unbiased* recommendations from your Garlock representative. Call him, or write for LATTICE-BRAID Catalog AD 131.

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada. For information on other fluorocarbon plastic products contact United States Gasket Company, Plastics Division of Garlock.

*DuPont Company Trademark †Registered Trademarks

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

For more facts circle 571 on Reply Card

Oxygen Producing Plant Built On the Spot—the User's Steel Mill

A GASEOUS OXYGEN producing plant, built, owned and operated by Linde Co., Div. of Union Carbide Corp., is wholly in the service of the Duquesne Works of the U. S. Steel Corp. at Duquesne, Pa. The unit has a rated capacity of more than 500 tons of oxygen per day, and about 90 per cent of its production is being used to increase output and reduce fuel consumption in the Duquesne Works' ferromanganese blast furnaces.

Oxygen fed into the ferromanganese furnaces is refined to 95 per cent purity; the remaining 10 per cent is brought to 99.5 per cent purity, for use in electric furnaces, cutting and scarfing torches and other applications.

To assure a continuous supply a low purity oxygen when necessary repair and maintenance shuts down the unit, a 15-hour reserve will be stored in a 10 million cu ft tank.

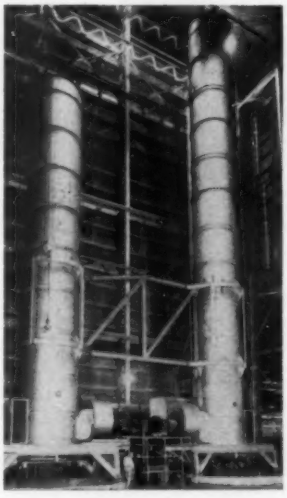
A three-month test, conducted in late 1954 and early 1955, demonstrated the benefits of adding oxygen to the air blast entering the furnaces. This test was made with oxygen transported by Linde in trucks and rail cars, which easily met the demand for 300,000 cu ft per hour of oxygen. Satisfaction with the test resulted in the construction of the oxygen producing plant on the steel works' property. With the additional oxygen, normal daily production of 700 tons of ferromanganese is expected to increase by 25 per cent, while coke consumption decreases.

"Little Brother" Reactor

ITS ENTIRE CORE submerged in 20 ft of water, a full-scale mockup of an engineering test reactor is a feature of the Phillips Petroleum Co.'s facility at Idaho Falls, Idaho. Located in a building adjacent to the main test reactor, the low-power reactor is designed to provide information necessary to the safe operation of its big brother, which was designed and built by Phillips.

The 10 by 10 lattice of the "little" reactor contains space for 49 ETR assemblies, experiments, control and regulating rods.

Heat Treating, Straight Up



HIGHER THAN a 10-story building, a heat treating furnace is in operation at the Harvey Aluminum plant, Torrance, California.

The vertical electric furnace, 110 ft high and seven feet in diameter, was designed and constructed by Westinghouse Electric Corp., to heat treat extruded aluminum alloy shapes. Pieces up to 80 ft long are hung in the furnace, heated, and dropped into a 110-ft-deep quenching tank, sunk in the ground under the furnace. A smaller furnace, 70 ft high, is also used.

Mobile Tractor Assembly Training Units, Complete With Mock-Ups, Travel U. S.

TWO HUGE VANS containing nearly $50,000 worth of tractor assemblies and components are taking a complete plant service training school throughout the nation.

An experienced staff of Case servicemen from the J. I. Case Co. accompanies each mobile training unit and will present three-day courses in maintenance and service of Case wheel and crawler tractors and equipment in various dealers' shops. One unit is now operating in the mid-west and far-west, while other visits eastern and southern U. S.

Use of mock-up, cut-away and tear-down units enables dealer service personnel to observe the action, as well as to actually disassemble, every important tractor component from the engine down to the hydraulic valves. Colored slides, charts and other visual aids are also used.

One of the many training units shown is a mock-up of the counter-rotating transmission used in some of the company's crawlers. Also included is a complete sub-frame assembly showing operating controls for the hydraulic transmission. Cut-away units include gasoline and diesel engines, hydraulic pumps and valves, hydraulic and mechanical clutches, torque converters, track rollers, and other parts.

Hall Industrial Water Report

VOLUME 5 OCTOBER 1957 NUMBER 5

Waste Is Waste

In some cases, waste water is truly just "waste" and must be disposed of in the least costly manner; in others, waste water may contain valuable materials, so that failure to recover these before discarding the water is "waste" in a different sense.

Specialized knowledge and experience are necessary to search effectively for the economical changes which can be made in a plant to minimize loss of valuable materials, to confine pollution to the smallest volume of waste water, to decide what treating procedures should be used and what control should be exercised. Hall staff engineers and industry specialists have the training and experience required and are ready to tackle your problems.

Who Muddied the Waters

A mid-western tire plant wished to reduce or eliminate pollution of waste water. As a first step, a plant survey was made by Hall Staff Engineer E. G. Paulson.

This survey narrowed the major source of waste water contamination to several plant operations. The next step involved gauging, sampling and analytical work on the plant effluent and on inplant waters. This established that the primary contaminant was suspended solids, presumably from a process where clay slurry was sprayed on an intermediate product. However, material balance calculations disclosed a major discrepancy between estimated clay pollution and actual suspended solids concentration of the waste water.

The third step was a resurvey to definitely identify the suspended solids as clay and to confirm the high concentration in the waste water. The outcome was that the suspended material was almost all clay, that clay was used in only one section of the plant and that the amount of clay getting into the plant effluent was greater than had been estimated.

This case is a good example of how stepwise approach to a pollution problem can pay dividends. Plant engineers and Hall personnel changed the process for applying the clay slurry and another survey showed that the pollution loading was reduced by more than 85 percent. The cost of making the changes will be recovered in 18 months by the saving in process material.

Whittling Away at Waste

More than ten years ago an eastern detinning plant contracted with Hall Laboratories for a long-range program to eliminate objectionable contamination of waste water in the most economical and satisfactory manner.

Initial studies on the sanitary and process water systems were made to determine the pollution load. One of the first results was segregation of the sanitary sewage and its discharge to a municipal sewage system.

The remaining waste water came from seven different locations in the plant.

Continuing study showed three streams to be uncontaminated and one stream to be contaminated only periodically. Investigation was extended to determine whether water could be recycled and whether the volume of polluted water could be decreased.

After inplant changes were made to segregate uncontaminated water from polluted water, there remained three polluted streams, one flowing rinse and two batch dumps. Joint efforts of the plant's research department and Hall Laboratories resulted in development of methods for treating the contaminated waters. An economic study showed that with properly designed treating equipment almost $400 per day could be saved by recovery of valuable materials. This was over and above the operating cost and depreciation on the new equipment.

A more efficient reclamation process eliminated two of the three polluted streams and left one very heavily contaminated batch dump. With only one polluted water stream requiring treatment and with the method of treatment already determined, the problem has been whittled down to a simple answer. This is an excellent example of what can be accomplished by cooperation between plant personnel and Hall engineers.

From Shortage to Abundance

An eastern electrical products manufacturer faced a serious water supply problem. Expanding operations required more water. The two supply sources, plant wells and city water, were inadequate. The wells were already being pumped to the limit of their capacity and the city wanted to supply less water because of increased domestic requirements.

Hall staff engineers were called in to survey the water situation. They found that city water consumption could be reduced 40 percent by reuse and modification of water use in manufacturing processes. They discovered also that because of the long time required to regain maximum pumping capacity after shutting down, the plant operators were running the well pumps continuously, sending much water to waste during non-working shifts.

Two recommendations were made. One involved the changes necessary to reduce city water consumption and the other was to install storage tanks to collect the well water being wasted. The estimated water saving was close to 500,000 gallons per day.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Division of Hagan Chemicals & Controls, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 572 on Reply Card

Hook Line Conveyor System Steps Up Casting Production

NEW HOOK LINE CONVEYOR system installed in the Gaines Company's foundry in Rivera, Calif., gives the line a production capacity in aluminum and magnesium castings of 20,000 pounds per eight-hour shift.

The production line served by the hook conveyor system covers 5,000 sq ft of the 30,000 sq ft Gaines plant. Eight Fischer gas furnaces, with a capacity of 550 lb serve this permanent mold line. Thirty-two molders are employed on each shift.

Thirty-two different jobs can be run on the assembly line simultaneously. Average time from casting to customer delivery for each job is five days. From casting to heat treat is 24 hours.

Castings up to 300 lb can be handled on the permanent mold line, though this maximum weight is rare since the bulk of the work handled by Gaines is for the aircraft industry where lower weights are a necessity.

Use of the hook line conveyor system enables foreman to know the exact production status of each job on the line. Too, loss of parts, as frequently occurs when parts are put in barrels and then overlooked, is eliminated. Again, parts are no longer stacked on the floor in the immediate mold area to hamper the efficient and safe movement of the operator.

The hook conveyor line is 230 ft in total length and has 250 hooks that travel at 15 or 30 fpm as desired, cutting 48 to 60 hours from normal production flow time. Only limiting factor to greater time cuts is the cooling period

required for castings after they are poured into the mold.

Castings are put onto the hook line conveyor as soon as they are taken out of the mold. They move along the line to the shakeout man who knocks cores out of them and then onto the hot inspection station. The conveyor enables the inspector to work from one station, rather than moving around the line, and he checks each part as is comes past him. Checking of all parts has greatly reduced scrap, with 5 to 7 per cent per unit cost savings.

Plant Sewage System Reconstruction Completed in Five Years

FIVE-YEAR PROGRAM to reconstruct and improve all sewage and waste systems at Rossford, Thermopane and East Broadway plants of Libbey-Owens-Ford Glass Company has been completed at a cost of about $550,000.

At Rossford, nearly 1½ miles of sewers ranging from 6 to 12-inch lines, three metering stations and a pumping station were installed so as to divert all sanitary wastes from the Rossford and Thermopane plants.

At East Broadway where the Laminating and Plate glass plants and Technical Building are located, only 1,640 ft of new sewer was necessary but an elaborate treatment plant, (shown in photograph) costing more than $125,000 to reclaim oil wastes was built. A complete revision of four separate sewer systems serving the plants was made.

From those plants most of the waste water from operations goes into Otter Creek but the separate sanitary system ties into Toledo city interceptors.

The Laminating plant at East Broadway uses straw oil in the autoclave process of applying pressure and heat to safety glass units, has some waste from coolants, suspended solids from edge-grinding, and wastes from glass washing units. All of these liquids now go through the treatment plant to remove any oil or solid wastes before the effluent goes into Otter Creek.

At both Rossford and East Toledo a vast amount of water is used for cooling operations in glass melting and in grinding of plate glass. Grinding water is conveyed to the large sand ponds where evaporation and slow percolation eliminates it as a factor from any pollution. Glass furnace cooling water is recirculated at both of the large plants and cooled by an aeration system.

Libbey-Owens-Ford is the largest customer for Toledo city water using about 200,000,000 gal a month in addition to pumping 616,500,000 gal monthly from the Maumee River for cooling and grinding operations at Rossford—total equivalent to water needs for a city of about 160,000 population.

Besides using engineering and construction personnel in the LOF Engineering department, the firm of Finkbeiner, Pettis & Strout, consulting engineers was engaged to make a complete study of LOF existing sewer systems, some of which had developed piecemeal over a period of more than 25 years. During the study, most of the flow was traced with colored dyes so there was positive identification of sources and routes of all liquid waste materials.

Putting all of the principal processing wastes through the new treatment plant at East Broadway at a rate of more than 350,000 gallons a day insures an effluent into Otter Creek which meets state health standards. The treatment is largely a chemical process similar to that employed in city filtration plants.

UP IN PERFORMANCE—
down IN SIZE!
Clayton STEAM GENERATORS
SAME HORSEPOWER IN AS LITTLE AS 1/4 THE SPACE!

Completely automatic in operation, Clayton generators give you more horsepower in less space than other generators. They're up to 400% more efficient; foot for foot and pound for pound they give you four times the horsepower of boilers with ordinary thermal circulation because of Clayton's exclusive mechanical control of every phase of steam generation.

SO IS THE CLAYTON TO THE ORDINARY STEAM GENERATOR

RELEASES SPACE FOR PRODUCTION USE—

The Clayton "package" steam generator is a complete unit, integrally mounted on rigid welded steel self supporting frame, ready for easy installation and immediate use. No need to remove walls. Rigging and transportation costs are reduced and there are no extras to buy. Models from 15 to 100 HP require only 15 to 28 sq. ft. of floor.

SO LIGHT, SO COMPACT—SPOT THEM ANYWHERE—

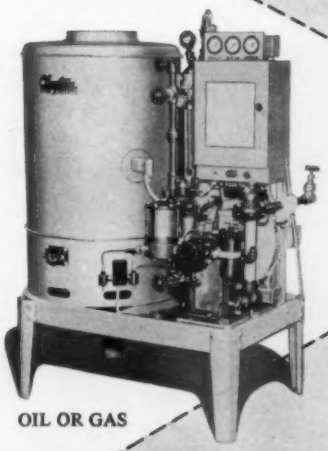
Years-ahead design and higher thermal efficiency make Clayton steam generators so compact they can be installed anywhere, on roof, basement or where-ever there is a need for steam. Special foundations unnecessary since floor loading is no problem. It's far more efficient to install several Clayton steam generators than to depend upon a single, outmoded central boiler.

ADDED STEAM FOR MORE PRODUCTION—QUICKLY—CONTROLLED

steam generation is the secret of Clayton efficiency. Advanced design gives you higher efficiency throughout overall operating range, provides full horsepower from a cold start within 3 minutes, yet reduces fuel cost as much as 50%. And it automatically adjusts to steam load requirements. Servicing is easy and operation is clean.

THEY LAST LONGER TOO!

Of every 100 Clayton generators produced (in the last 26 years), 97 are still serving users profitably and efficiently.



OIL OR GAS

Exclusive!

Compare Clayton's 5-year published coil warranty covering material and labor.

Clayton MANUFACTURING COMPANY EL MONTE, CALIF.

Clayton Manufacturing Company
P. O. Box 550, El Monte, California

Gentlemen:
Please send us the complete details about Clayton Steam Generators and how we can save floor space and increase our steam production.

Name_____
Company_____
Address_____
City_____ Zone____ State_____
We use steam for_____

For more facts circle 573 on Reply Card

NEW PLANT CONSTRUCTION — advance information on location, costs

Danbury, Conn.—Barden Corp., plans to construct a new plant for the manufacture and production of ball bearings. New facility will have a manufacturing area of approximately 150,000 sq ft and will be erected on company property located at Sugar Hollow Road. Austin Co., 19 Rector Street, New York, N. Y., have been awarded the construction contract reported to be in excess of $1 million.

Tampa, Fla.—Anheuser-Busch, Inc., 721 Pestalozzi St., St. Louis, Mo., has purchased a 160-acre plant site in an industrial park area near here on which it plans to build a brewery, at an approximate cost of $20 million. Construction will get under way the latter part of this year for completion about 18 months after construction is started.

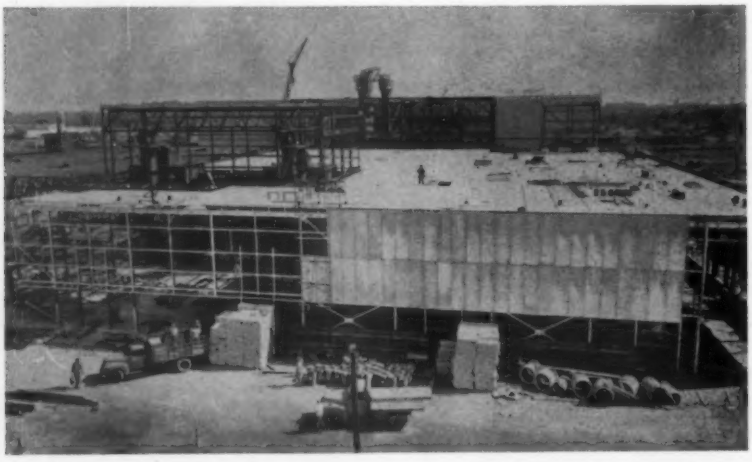
Tampa, Fla.—Florida Steel Corp., has announced that its wholly owned Florida Electric Steel Mill Corp., has acquired a 12-acre plant site near here on which it plans to build a steel mill. Equipment has already been purchased and the plant is expected to go into production by late 1958 at a reported cost of $2 million.

Elk Grove, Ill.—Hotpoint Co., a Division of General Electric Co., 5600 W. Taylor St., Chicago 44, Ill., has acquired a 770-acre tract of land here on which company proposes to construct a 108,000-sq ft refrigerator compressor plant. Construction of new plant will get under way soon for completion in 1959.

Franklin Park, Ill. — Motorola Inc., 4545 W. Augusta Blvd., Chicago, Ill., has announced plans for major expansion of company's facilities at local plant here. Building program involves an addition to present manufacturing facilities, erection of an office and engineering building, and a large addition to company's television and Hi-Fi assembly plants. Cost of total expansion reported to be in excess of $3 million.

Harvey, Ill.—Allis-Chalmers Manufacturing Co., 864 S. 70th St., Milwaukee 1, Wis., plans to construct a new engineering development and research laboratory at company's Buda Division Works here. Ground for the new facility has already been broken and plant is expected to be in full production by mid-1958. New laboratory center will include a central engineering building, an engine and material handling product development laboratory and an engine test wing. Cost of new plant with equipment, reported to be about $3.2 million.

Riverdale, Ill.—Acme Steel Co., 2836 Archer Ave., Chicago 8, Ill., has broken ground for a $23-million steel-making plant, which will produce an estimated 450,000 tons of billets and slabs annually. New plant will be the first in the country to use the combination of hot blast cupolas and oxygen blown converters in steel production.



Work is proceeding ahead of schedule on the construction of the new malleable foundry at Link-Belt Company's Ewart plant in Indianapolis, Indiana, and it is expected to go into production during December of this year or early January

Wood River, Ill.—Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill., is planning a multi-million dollar expansion program at local refinery. Program consists of the construction of a 67,500-bbl per day crude oil distillation unit and a 30,000-bbl per day fluid catalytic cracking unit. Work will get under way at once for scheduled completion in 1959.

Evansville, Ind. — Inland Container Corp., 70 W. Morris St., Indianapolis, Ind., has announced plans for the immediate construction of a new corrugated box manufacturing plant to replace present facilities. Work is already under way and new plant will have more than 150,000-sq ft of manufacturing space when placed into production the early part of 1958. Project will represent an investment in excess of $2 million with equipment.

Hammond, Ind. — Stauffer Chemical Co., 382 Madison Ave., New York, N. Y., plans to construct a large sulfuric acid regeneration plant here which will process oil refinery sludge acids. Company plans to spend over $4 million on the new facility which will have a daily capacity of 400 tons when it goes on stream.

Calvert City, Ky. — Air Reduction Chemical Co., a division of Air Reduction Co., 150 E. 42nd St., New York, N. Y., plans to construct two new manufacturing plants. Ground for the two plants has already been broken. One will have a capacity of three million pounds annually of methyl butynol and methyl pentynol and the other will produce about two million pounds a year of vinyl stearate. Investment reported to be approximately $2 million.

Henderson, Ky. — Spencer Chemical Co., Dwight Building, Kansas City, Mo., has authorized plans for the construction of new urea plant at company's local works here. New facility when completed in the summer of 1958 will produce about 100 tons of urea daily.

Acton, Mass. — Air Reduction Sales Co., a division of Air Reduction Co., 150 E. 42nd St., New York, N. Y., is constructing a new air separation plant. Plant will be designed to produce 75 tons of oxygen, nitrogen and argon daily and is scheduled to go into production by the summer of 1958. Cost of the plant including related distribution facilities reported to be in excess of $9 million.

Alma, Mich.—Leonard Refineries, Inc., Thomas & E. Superior Streets, has announced plans for a $4 million expansion program at local refinery here. Under the program, a new cracking unit will be constructed. Company also plans to build a 43-mile pipeline from Alma to Lansing where a terminal will be built to load trucks with the company's petroleum products. Both these projects are scheduled for completion by early 1959.

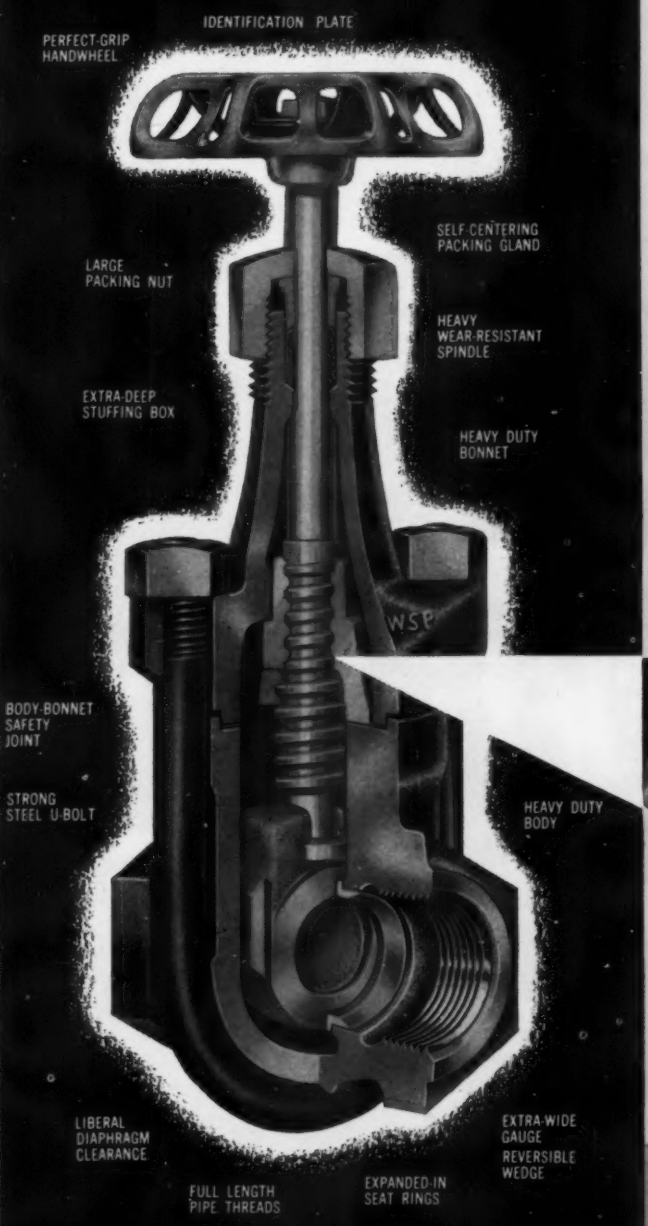
Minneapolis, Minn.—Federal Container Corp., a subsidiary of Fibreboard Products, Inc., 1789 Montgomery St., San Francisco, Calif., plans a major plant addition to present facilities. Plans call for a 60,000-sq ft plant addition to be

(Continued on page 260)

Only the big line of

JENKINS U-BOLT GATES

has all these dollar-saving features



WIDE CHOICE

Inside Screw and O.S.&Y., patterns . . . Iron Body with Bronze or Stainless Steel Mounting, All Iron, Ni-Resist with Type 316 Stainless Steel trim. GET FOLDER NO. 207 about the complete line. Ask your local Jenkins Distributor, or write Jenkins Bros., 100 Park Avenue, New York 17.

Priced no higher

DESIGNED TO COST LESS TO USE

Built right into a Jenkins U-Bolt Gate Valve are dollar-saving features no other can match. Construction superiorities that equip this valve to take punishment longer . . . saving dollars in replacement bills. Features that cut maintenance time and the cost of replacement parts . . . saving more dollars. For a good example, look at the unique Renewable Bonnet Saver Bushing which is a patented feature of Inside Screw valves.

BONNET-SAVER BUSHING

No need to junk a bonnet with worn operating threads. Just slip in a new bushing for good-as-new thread engagement . . . saving bonnet and lengthening spindle life.

JENKINS VALVES

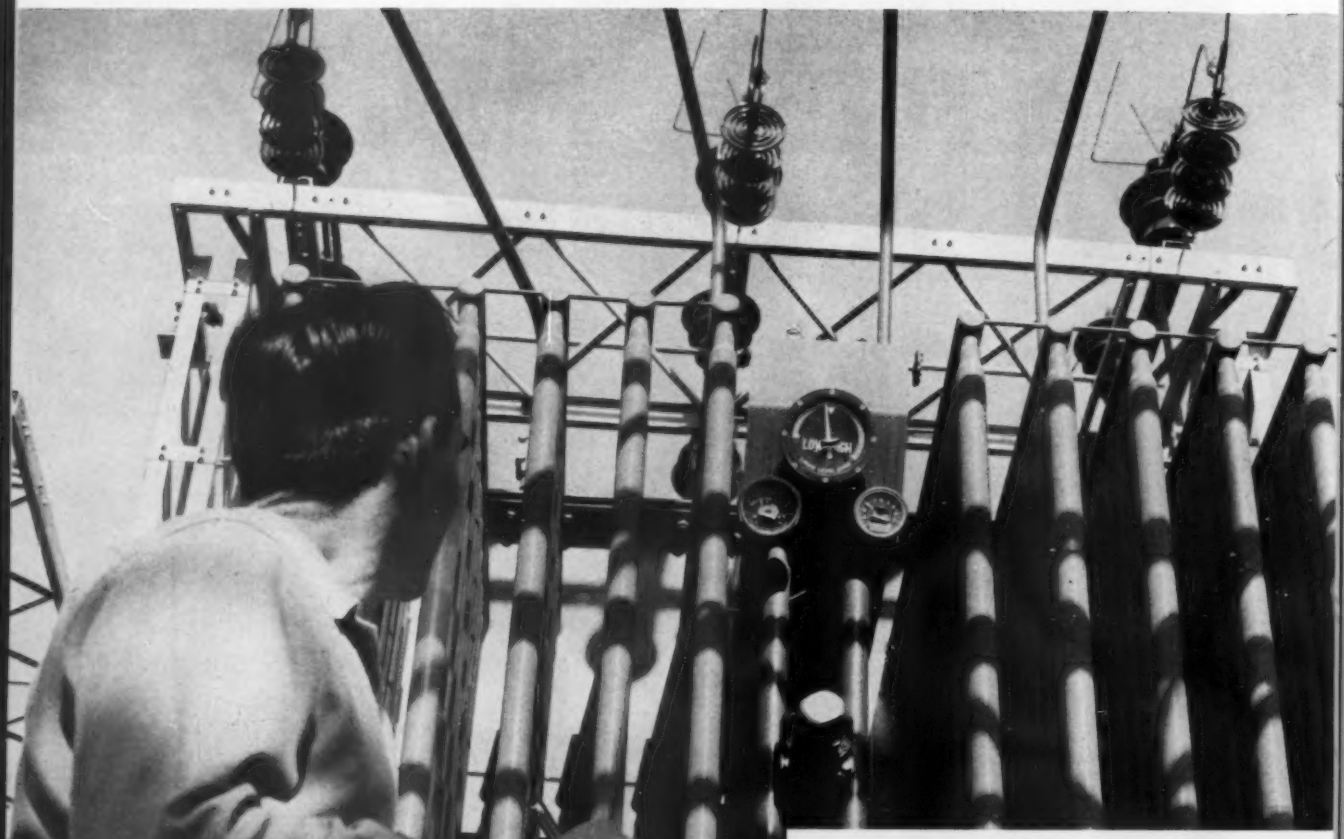
LOOK FOR THE JENKINS DIAMOND

JENKINS SINCE 1864 Jenkins Bros.

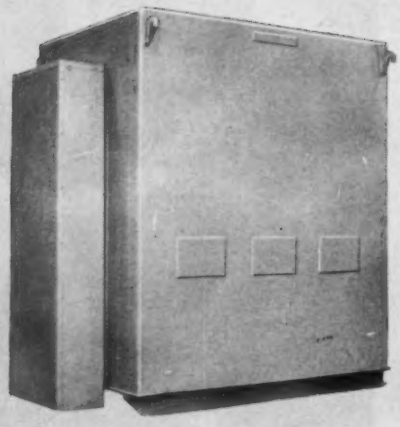
Sold Through Leading Distributors Everywhere

For more facts circle 574 on Reply Card

Reduce maintenance 20% with



MORE TRANSFORMERS*



SEALED DRY-TYPE transformers, rated 300 to 2000 kva, 15 kv and below, are virtually maintenance free. Ideal where atmospheric problems exist.

General Electric RM medium transformers

If your new or modernized plant power system calls for transformers 501 to 7500 kva, 69 kv and below, you'll benefit from reduced maintenance on General Electric RM (Repetitive Manufacture) medium transformers.

These G-E features have helped owners cut transformer maintenance time and costs 20 percent and more:

Control-center arrangement of instruments and gages makes them easier to read, easier to service.

Full drain permits sampling of oil from the very bottom of the tank, where water or sediment could collect. This allows less frequent, more complete inspections.

Super Melaglyp finish gives you up to 150% longer paint life. A spray-on can is furnished with each transformer so you can touch-up, prevent rust spots.

MORE RM MEDIUM TRANSFORMER BENEFITS:

Reduced maintenance is only one of the outstanding benefits you'll receive. Here are more:

Faster, less expensive installation—shipped completely assembled, RM medium transformers have features such as ski-tip bases, extra jacking space, and reversible junction boxes which can cut installation time to only four hours.

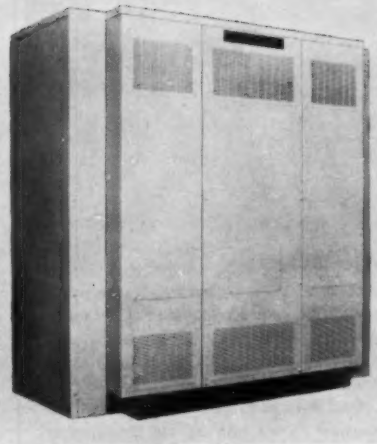
Shorter shipments—standardization of design and General Electric's repetitive manufacture process cut shipping time to 10 weeks. Voltage ratings and optional features available make these standard units ideal for most industrial applications.

Before you buy a medium transformer, contact your nearest General Electric Apparatus Sales Office. You'll discover how faster shipment, easier installation, reduced maintenance, and longer life add up to more for your transformer dollar. General Electric Company, Schenectady 5, New York. 416-14

Progress Is Our Most Important Product

GENERAL ELECTRIC

FOR INDUSTRIAL USE FROM THE COMPLETE GENERAL ELECTRIC LINE



OPEN DRY-TYPE transformers, rated 300 to 2000 kva, 15 kv and below, are used in clean, dry, indoor locations where weight or floor space present problems. Light enough to mount overhead!

LIQUID-FILLED transformers, rated 112½ to 500 kva, 15 kv and below, conveniently and economically supply small blocks of power. Outdoor units are oil-filled; indoor, Pyranol† filled.

*** These same transformers are also incorporated in General Electric's outstanding line of load-center and distribution-center unit substations.**

† Reg. Trade-mark of General Electric Company.

For more facts circle 575 on Reply Card

Bucyrus-Erie Transit Cranes give mobile service the year around. This 22-B handles prefabricated steel at owner's yard in Milwaukee, Wisconsin.

Bucyrus-Erie crawler cranes have the stability needed for capacity lifts . . . are built for trouble-free service. The 15-B pictured handles equipment for a New York firm.

Get More Power, Speed on Handling Jobs!

Packing plenty of power and high-lift capacity into a stable, maneuverable unit, Bucyrus-Eries give you the extra features that turn yard material handling into a speedy, profitable operation.

You profit from such advantages as strong open-throat boom of welded latticed box section construction. The boom easily withstands the compression and swinging stresses of big loads . . . has widespread feet for proper load distribution. Butt splices make it easy to insert or exchange extra boom section. Open throat permits rigging 2, 3, or 4 parts of line.

Popular choices of plant managers are the Bucyrus-Erie 15-B, 22-B, and 30-B crawler-mounted cranes. A Heavy Duty 22-B is offered with special features for extra-heavy lifts.

These cranes are also available in carrier-mounted Transit Machines with rated capacities of 15, 25, and 35 tons respectively.

Your nearby Bucyrus-Erie distributor has all the facts on all these cranes. Contact him soon for full details. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

370E57

BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

If your operations call for a compact crane to squeeze into tight places and precision control that lets you place loads with the deftness of a human hand, an all-hydraulic Hydrocrane is the machine for you.

Five-ton and 10-ton capacity Hydrocranes have hydraulic telescoping booms to reach into boxcars, semi's, etc. They are fast and compact, with the shortest tail swing in the business . . . can work in tight quarters in your plant area or in off-plant job sites. The Hydrocrane shown lifts an air conditioning unit to a store roof in Minneapolis, Minn.

For more facts circle 728 on Reply Card

One of a series.

Some Things to Think About Steam Traps

...in order to get high operating efficiency and a minimum of maintenance

The gentleman who invented the wheel had a basic idea and so far no one has come up with anything better for the purpose.

If you'll pardon us for a little overemphasis on the significance of steam traps, we'd like to liken one of them to the wheel.

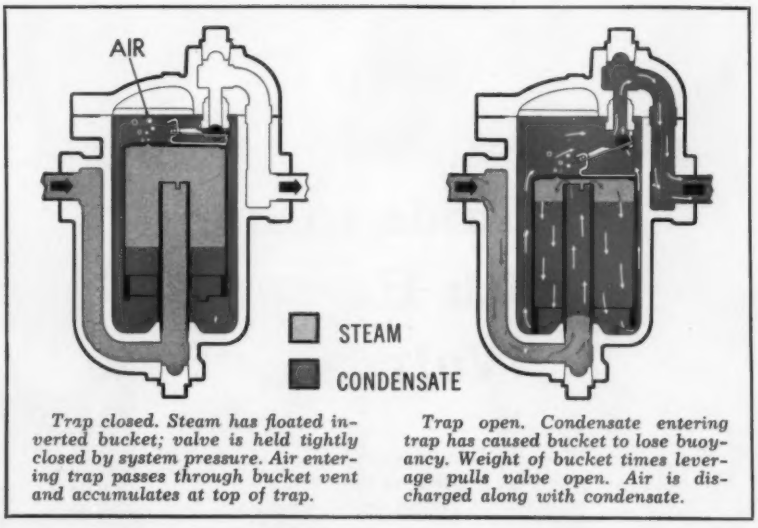
In 1911, when the first Armstrong inverted bucket steam trap model was announced to the world, or at least that part of the world that modest advertising and sales budgets would cover, it was not received with equal enthusiasm by all (especially old-style trap makers). But, like the wheel, it managed to find its way into general use. And, nothing better has ever turned up for the purpose of draining condensate. As a matter of fact, the Armstrong trap has been very widely copied. Today, there are more inverted bucket traps draining process equipment than any other kind. Of these, there are more Armstrongs.

If this sounds like the boasting of a proud parent, give consideration to some fundamental requirements not met by all traps:

1. ***A steam trap should not leak steam.*** Some traps do, you know, because of the nature of their operating principle. No steam ever gets to the Armstrong trap orifice. The valve is always water sealed.

2. ***A steam trap should vent "air" as fast as it accumulates***—otherwise temperatures are reduced and corrosion is a problem. The Armstrong trap handles air very nicely. The vent in the bucket permits air to accumulate in the top of the trap, from where it is discharged when the trap opens. For extreme conditions like draining paper machine dryers, some jacketed kettles and certain other units, the vent is sized larger for the job. And, for handling big volumes of air during warm-up, a bucket with an auxiliary thermic vent really speeds up heating.

3. ***A steam trap should discharge condensate at steam temperature*** if you want to get maximum efficiency from the unit drained. And most people certainly do. If you have to wait for the condensate to cool, it's almost impossible to maintain maximum temperatures and prevent air build-up. You guessed it—the Armstrong trap opens for water, without dependence on temperature.



Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

4. ***A steam trap should be suitable for any return system.*** The Armstrong trap works just the same whether discharging to atmosphere, back pressure or vacuum. It has been conclusively proved that flash steam resulting from use of a bucket trap does not cause a problem in vacuum return systems. The flash condenses rapidly. It's the leaky traps that cause the headaches.

5. ***A steam trap should not be a "prima donna".*** Some kinds of traps take an awful lot of care and coddling. The Armstrong trap is a rough and ready type with a hardened chrome steel constitution (valve and seat, to be exact). It cleans itself of ordinary dirt and scale without choking up. Its 18-8 stainless parts stave off rust and corrosion. It resists wire-drawing and wear remarkably well. In fact, it stays on the job longer with less attention than any trap ever produced. Unless you live in Siberia, you can probably find a user around the corner who will tell you so from experience.

6. ***A trap should not be an "orphan".*** With Armstrong traps you can *always* get prompt service and parts from nearby Factory Representatives and stocking distributors as well as from the factory.

7. ***A trap should have a guarantee.*** The Armstrong trap is unconditionally guaranteed to give you *complete satisfaction* (as to doing its job, that is). If it doesn't, you can get your money back.

If you'd like to buy some of these excellent steam traps, call your local Armstrong Representative or write **Armstrong Machine Works, 9121 Maple St., Three Rivers, Michigan.**

ASK FOR the 44-page Steam Trap Book, free on request without obligation.

ARMSTRONG STEAM TRAPS

For more facts circle 576 on Reply Card

keep hard-to-hold fluids in hand with Hamer Valves!

When the service conditions are tough and a lot is riding on the valves performance, play it safe, specify and install a Hamer Valve.
Why a Hamer Valve? The reason is simply proven dependable performance ...a performance that has measured up time and time again under some of the most crucial service conditions to which any valve has ever been subjected.
Why are Hamer Valves so outstanding? We feel it is because of the extra measure of effort given to their design and manufacture. Hamer Valves are made slowly, carefully. Each valve part is individually inspected, each valve individually tested, each customer order analyzed to be sure the valves ordered are the right ones to do the job expected of it. Nothing is left to chance or guess. To be sure, you will pay a little more for a Hamer Valve. But the unmatched performance, makes the additional cost well worth it for these fine Hamer Valves, truly a valve without equal.

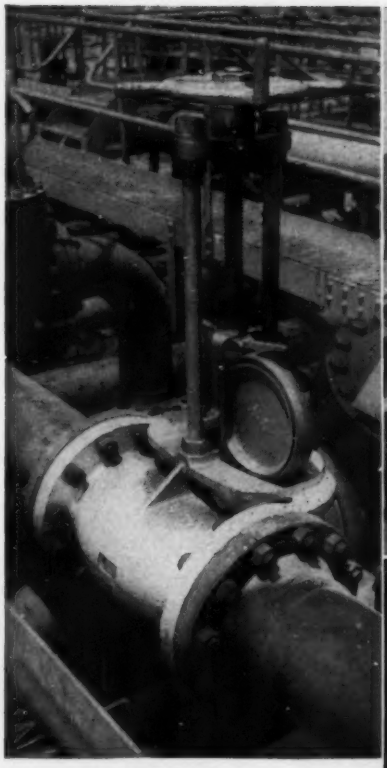
HAMER LINE BLIND VALVES

No contamination allowed here...

World-wide usage of the Hamer Line Blind for over two decades where absolute blanking of a line is required, is proof positive of this valve's effectiveness.
In addition, these remarkable valves will actually pay for themselves through savings gained by fast one man, one minute operation, elimination of complicated piping and costly downtime.

Hamer VALVES, Inc.

P.O. BOX 1851, 2919 GARDENIA AVE., LONG BEACH, CALIF.
REPRESENTATIVES THROUGHOUT THE WORLD



HAMER VISIBLE WEDGE

Foolproof line shut-off

A new high in safety, stability and simplicity of operation is incorporated in this outstanding rigid-type Visible Wedge Blind Valve. Precision metal-to-metal fit of the wedge and seats, plus dependable seal rings, provides a foolproof line shut-off that's both positive and permanent.

HAMER GATE VALVES

Leakproof Shutoff, Upstream, Downstream...

This remarkable valve combines a double sealing action through its metal to metal fit of the wedge plus two Teflon* seal rings. Actually one Hamer Gate Valve will do the job which formerly required two Gates for a double block and bleed arrangement. In addition, the wedge guide is precision machined to exacting tolerances. Eliminates chatter and mechanical wear caused by line pulsation and accurately centralizes the wedge between the seats.

*R. TM Dupont

HAMER PLUG VALVES

This Lift-Type Plug can't stick ever!

The plug adjusting nut, an exclusive feature on all Hamer Plug Valves permits the plug to be lifted slightly from its seat, making it easy to open or close the valve. A simple turn lowers the plug back into its seat and holds it there in perfect alignment. No matter what the service conditions, or lapse of time between operations, this outstanding Hamer feature assures POSITIVE E-Z Turn control of the plug at all times.

Send for Free Literature

Bulletins on all Hamer Valves are available and will be sent upon request

HAMER "POSITIVE ACTION" VALVES

For more facts circle 577 on Reply Card

Convair helps improve plant hygiene with SBS-30 waterless skin cleanser

In this ultra-modern plant are produced many of Democracy's air defenses. Here, too, is achieved an ultra-modern plant hygiene program with the help of SBS-30 Waterless Skin Cleanser.

To maintain cleanliness on this priority production, Convair has installed SBS-30 Waterless Skin Cleanser dispensers in "difficult soil areas". SBS-30 affords this fast, safe and thorough "on-the-job" way of cleaning that requires no water, plumbing or complicated installation.

Wherever they are installed, SBS-30 Waterless Skin Cleanser dispensers help Convair to produce savings through greater "on-the-job" efficiency. Man-hours are saved by reducing the number of trips to distant wash areas. The incidence of industrial dermatitis is reduced through improved personal hygiene.

Why don't you, like Convair and hundreds of other industrial leaders, take a serious look at SBS-30 Waterless Skin Cleanser. WRITE TODAY—we'll rush complete, detailed literature.

Write Dept. 57-J3

SBS
sugar beet products co.

SBS WATERLESS WASHSTATION*
"Brings The Washroom To The Worker"*

MAIN PLANT: 302 Waller St., Saginaw, Michigan
Los Angeles, California • Newark, New Jersey
CANADIAN SUBSIDIARY: Chemical By-Products, Ltd., 23 Racine Road, Rexdale, Ontario, Canada

*Trademark

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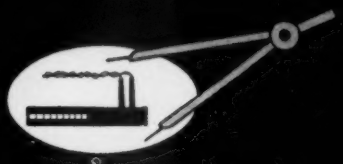
USING

DU PONT ELASTOMERS

neoprene ... hypalon



in industry

Neoprene conveyor hauling petroleum coke shows little deterioration after 2 years' constant use

Seals of HYPALON in heat exchanger are undamaged by 125° F. aqua regia fumes

J. Bishop & Co. Platinum Works, which specializes in the field of refining precious metals, uses a new tube-type heat exchanger to condense aqua regia fumes for safe disposal. The cooler in this unit contains 1,275 Pyrex tubes each ⅜ in. diameter and 10 ft. long. Water circulated through the tubes condenses the aqua regia fumes which are passed through the cooling chamber.

Each tube has three annular seals made of HYPALON. These resilient stoppers permit thermal expansion, yet prevent aqua regia leakage; seal water out of the cooling chamber. Despite the corrosive atmosphere, the seals of HYPALON have been used for over 13 months without a failure.

HYPALON is especially suited for service where conditions are extreme. In addition to chemical resistance, this newest Du Pont synthetic rubber is completely resistant to ozone and highly resistant to heat, abrasion, weathering and flex cracking. Seals, gaskets, tank linings are but a few applications. Send coupon for more details.

Seals of HYPALON resist corrosive action of hot aqua regia. 3,825 seals are used in this heat exchanger.

Head end of the 2000-ft. neoprene coke conveyor. Coke is lifted from pit to belt for transfer to storage area.

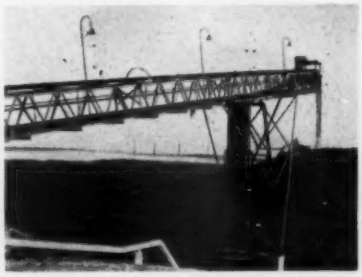
Neoprene's resistance to heat, oil, abrasion, weather keeps belt operating despite 150-tons-per-hour beating

At Union Oil Company's Santa Maria, California, refinery, two huge twin coker drums are used to vaporize gasoline from heated crude oil. This high-temperature process leaves a hot residue—petroleum coke—which is salvaged and sold to make lampblack, electrodes and other products. After the gasoline is distilled, the coke is removed from the drums with water jets under 2000-lb. pressure, and dumped into a pit for draining. It is carried from the pit to a storage area on a 2000-ft. neoprene conveyor belt at a rate of 150 tons per hour.

Depending upon how soon it is transferred to the conveyor, the coke may be hot or cooled. It may be wet or dried out and dusty. When dry, it ranges in size from fines to large lumps.

This oily and abrasive punishment would quickly ruin ordinary rubber, yet the neoprene conveyor has been in use over 2 years and is still good as new. Neoprene rollers are also used in place of steel belt idlers because abrasive coke could wear out or foul the metal parts.

Neoprene's resistance to heat, weather, oils and abrasion as well as to sunlight and chemicals makes possible this good service record. Its balanced combination of properties offers many opportunities for savings wherever you need a durable, resilient material for belting, hose, gaskets and other applications. Mail the coupon below for complete information.



Neoprene belt stays resilient and serviceable despite constant exposure to sunlight.

DU PONT

REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

☐ I am particularly interested in _____

☐ Send me a free copy of *The Du Pont Elastomers* (a review of properties of neoprene and HYPALON).

☐ Add my name to the free mailing list of the *Elastomers Notebook* (contains articles based on uses of Du Pont elastomers in industry).

E. I. du Pont de Nemours & Co. (Inc.)
Elastomer Chemicals Dept. PL-10
Wilmington 98, Delaware

Name _____

Firm _____

Address _____

City _____ State _____

For more facts circle 579 on Reply Card

GENERAL ELECTRIC SYNCHRONOUS

MOTOR CONTROL ASSURES

Maximum drive protection through "split-second" field removal

General Electric controls provide the fastest field removal—the most protection—available for synchronous motors and attached equipment. General Electric's "split-second" field-removal system removes the field excitation in approximately 1/120 of a second: technically, within one-half-slip cycle.

This field-removal system virtually eliminates the possibility of damage to synchronous motor drives that results from the motor pulling out-of-step. In the event of excessive torque, or fluctuations in line and excitation voltages, the control immediately removes the field excitation. This prevents damage to motor windings, to connected machinery, and to the distribution system, caused by the motor running out of synchronism with the field applied.

CONSTANT PROTECTION

G-E synchronous motor control provides constant protection from the time the start-button is pushed until the motor is de-energized. A graduated protection system prevents motor damage from overheating while starting but allows full utilization of the motor during acceleration. This system is controlled by the heating characteristics of the motor and not by a set time period.

MAXIMUM MOTOR UTILIZATION

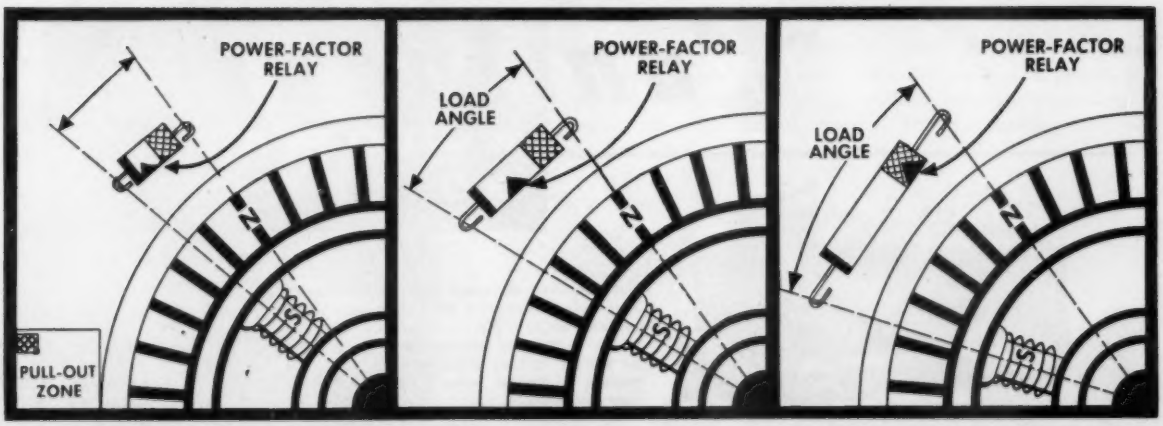
Your motor will deliver the power it was designed to produce as a result of the G-E precision field application system. The field is applied at exactly the right instant—assuring positive synchronization on the first attempt. In addition, the harmful effects of repeated slipping of poles and resulting motor stress are eliminated.

Assure maximum protection and utilization of your synchronous motor . . . specify the control that gives you all the "extras" as standard equipment: General Electric synchronous motor control. For more information, write for GEA-5873B, to Section 783-6, General Electric Co., Schenectady, N. Y., or contact your nearest G-E Apparatus Sales Office.

Industry Control Department, Roanoke, Virginia

GENERAL ELECTRIC

FASTEST FIELD REMOVAL AVAILABLE



DURING NORMAL OPERATION, the load angle is constantly measured by power-factor relay.

ADDITIONAL LOAD on motor increases load angle. Relay will not remove field if flux is sufficient to hold motor in step.

EXCESSIVE OVERLOAD, sufficient to cause out-of-step operation widens load angle, causes control to remove field.

For more facts circle 580 on Reply Card

The Boiler they threw the book at

You know exactly what a Continental Automatic Boiler will do, even while it's still in our factory. That's because we test and re-test it, at every stage in its manufacture, then fire-test it before shipment for a final performance-proof of its guaranteed efficiency of more than 80%.

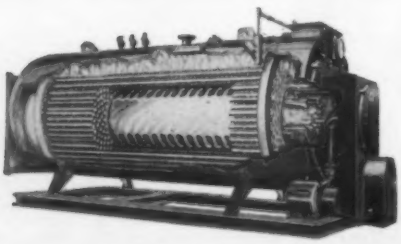
With a Continental, guesswork is out. You specify the right size for the job, not an oversized boiler just to play it safe. And each boiler-burner unit is rated on its own test-floor performance, not its square feet of heating surface.

Continental efficiency stays almost constant over a wide load range and a long service life. When plant expansion requires greater steam production, it's easy to add another performance-proved, fire-tested Continental Automatic Boiler — the boiler with the exclusive "Spinning Gas" feature. For details, send for Bulletin BE-3.

BOILER ENGINEERING & SUPPLY COMPANY, INC.

2 Manavon Street, Phoenixville, Pa.

The **Continental** AUTOMATIC BOILER



Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

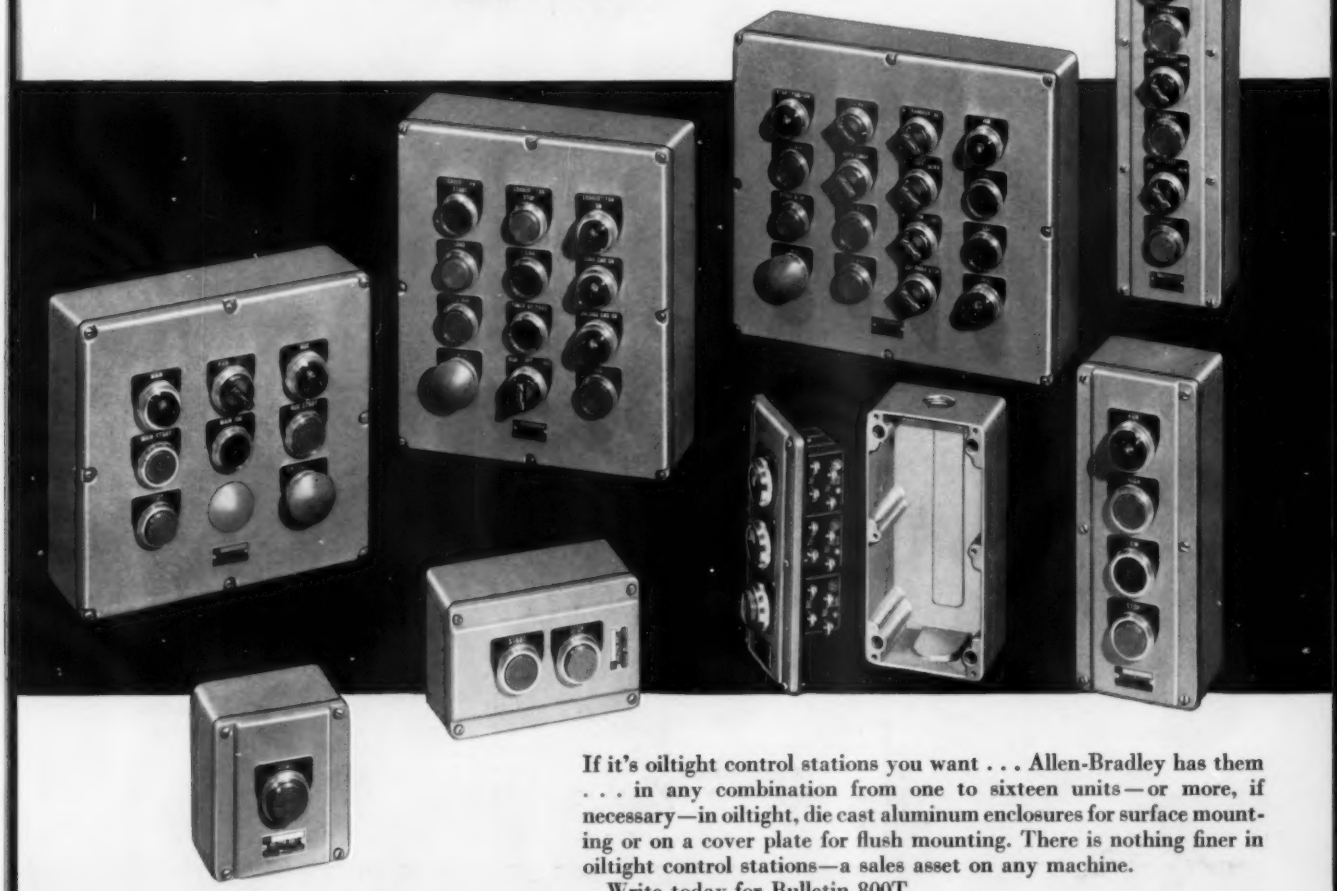
For more facts circle 581 on Reply Card

For more facts circle 582 on Reply Card →

NOTHING FINER IN oiltight control stations

A-B QUALITY

BULLETIN 800T

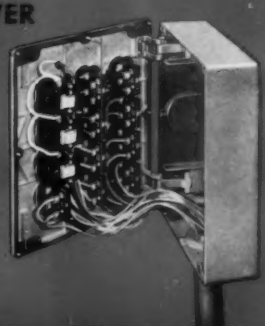


If it's oiltight control stations you want . . . Allen-Bradley has them . . . in any combination from one to sixteen units—or more, if necessary—in oiltight, die cast aluminum enclosures for surface mounting or on a cover plate for flush mounting. There is nothing finer in oiltight control stations—a sales asset on any machine.

Write today for Bulletin 800T.

HINGED COVER

The 9, 12, and 16-unit control stations have hinged covers. The hinge can easily be changed in the field from one side to the other.



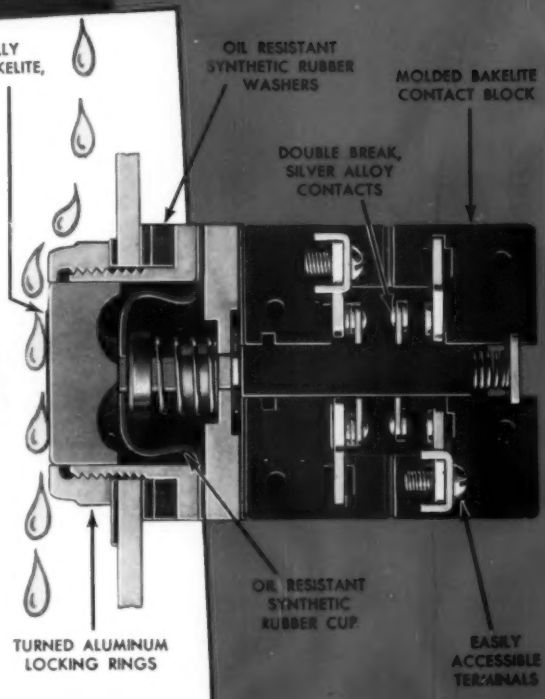
ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

10-57-RM

for machine tool application . . .

BULLETIN 800T oiltight control units

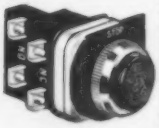

LARGE, FULLY GUARDED, BAKELITE, BUTTON
OIL RESISTANT SYNTHETIC RUBBER WASHERS
MOLDED BAKELITE CONTACT BLOCK
DOUBLE BREAK, SILVER ALLOY CONTACTS
OIL RESISTANT SYNTHETIC RUBBER CUP
TURNED ALUMINUM LOCKING RINGS
EASILY ACCESSIBLE TERMINALS

These rugged, reliable units were designed as pilot controls for a-c and d-c magnetic motor control. The oil resistant synthetic rubber cup and washers keep cutting fluids and oil away from the contacts, and thus prevent trouble. Push button units can be furnished with one, two, or four contact blocks—each equivalent to a separate single pole, double throw, switch unit.

For attractive appearance plus long life with reliable operation, select Allen-Bradley control units.

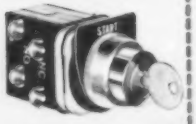
PUSH BUTTONS

Flush Head Start" Button

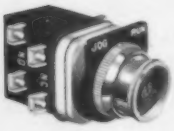


Extended Head "Stop" Button

Mushroom Head for Easy Operation

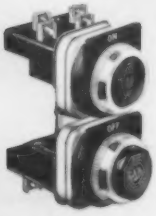


Push Button with Cylinder Lock



Push Button with "Selector" Sleeve

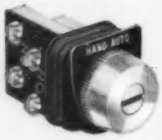
Wing Lever Push Button



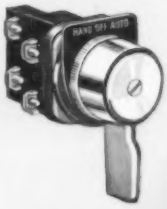
Maintained Contact Push Buttons

SELECTOR SWITCHES

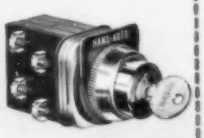
Three-Position Selector Switch



Two-Position Coin Slot Selector Switch



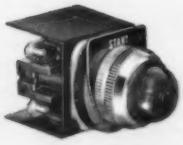
Wing Lever Selector Switch



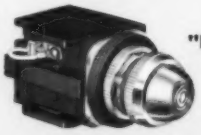
Selector Switch with Cylinder Lock

PILOT LIGHTS

Transformer Type Pilot Light



Full Voltage Pilot Light



"Press-to-Test" Pilot Light

A-B QUALITY

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

10-57-RM

THESE RESINS GIVE YOU NEW ANSWERS TO PRODUCT AND PROCESSING PROBLEMS

New improved Exon 900 series with tailored blending qualities means faster, more versatile production

. . . typical of the pin-pointed properties in Exon Vinyl Resins

Here is another addition to Firestone Exon's growing list of pin-pointed answers to specific problems: the new improved Exon 900 series.

These three new polyvinyl chloride resins offer many profitable advantages. The most important is greater versatility in both production and in the products you can make. For now Firestone gives you tailored blending to answer product and processing problems.

Firestone engineers have improved both the *absorptive* and *adsorptive* qualities of these new PVC resins. As a result, you get a greater pre-mix blending range, whether running hot or neutral. You can blend greater amounts of monomeric or polymeric plasticizer in the formulation. You get a wider area of temperature control.

To these temperature-tailored resins add the advantages of faster solvation, faster fusion rates in Banburys and mills, high quality, less fisheyes, greater product uniformity. New Exon 900 series resins give you greater dollar economies through quicker production.

Exon 911, 921 and 931 are just three of the resins in industry's most complete line of versatile vinyls. Another reason industry looks to Firestone Exon for engineered answers to its needs.

Consider your own production or product problem. Then for the resin properties pin-pointed to the best solution for you, check with Firestone.

Firestone

EXON

RESINS

For complete information and technical service, call or write:

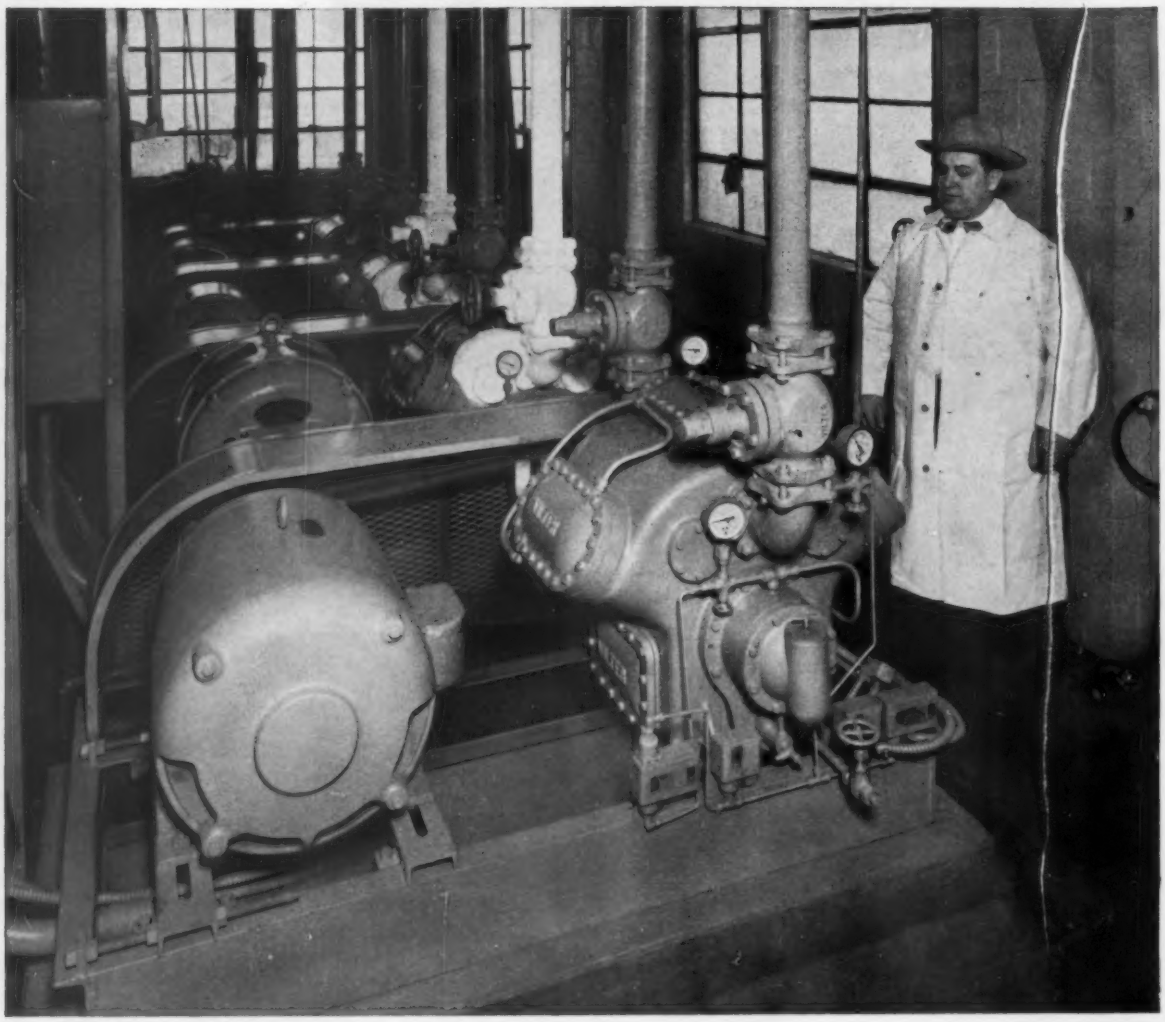
CHEMICAL SALES DIVISION: FIRESTONE PLASTICS COMPANY

DEPT. 718M, POTTSTOWN, PA. • A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

In Canada, Contact Chemical Sales Division, Firestone Tire And Rubber Company of Canada, Ltd., Hamilton, Ont.

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

For more facts circle 583 on Reply Card



THE VILTER MANUFACTURING COMPANY REPORTS:

To ensure top efficiency, we use V-belts reinforced with DACRON on our compressor drives

REG. U. S. PAT. OFF.

In keeping with its reputation as a leading manufacturer of refrigeration and air conditioning equipment, The Vilter Manufacturing Company of Milwaukee specifies V-belts reinforced with "Dacron"* for "Freon"** and ammonia compressor drives. These belts, manufactured with Du Pont "Dacron" by Durkee-Atwood, are easy to match . . . pull evenly and efficiently.

V-belts reinforced with "Dacron" give up to 40% more horsepower from belt drives than is possible with other reinforcing fibers. The ability of these belts to withstand greater shock loads, coupled with their longer flex life, results in remarkable durability. They stretch less and are more stable than other belts . . . require far less maintenance. And design men find they can use fewer and smaller belts and sheaves, meeting today's demand for more compact, more economical belt drives.

For the next drive you design or install, consider the advantages of premium V-belts made with "Dacron" polyester fiber made by Du Pont and the high skills of leading manufacturers who make the belts. E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Department, Wilmington 98, Delaware.

**"Dacron" is Du Pont's registered trademark for its polyester fiber.*
***"Freon" is Du Pont's registered trademark for its fluorinated hydrocarbons.*

DU PONT

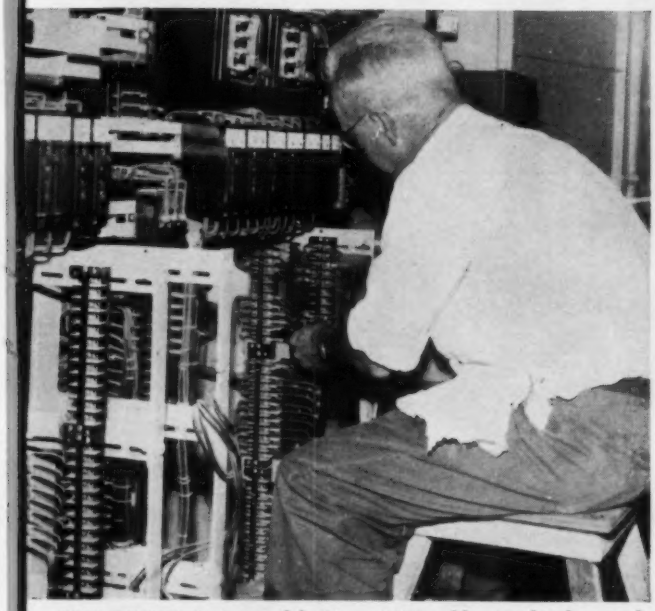
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

V-BELTS OF "DACRON" transmit more horsepower . . . stand greater shock loads . . . give longer flex life . . . give greater opportunities for machine-design improvement.

For more facts circle 584 on Reply Card

Whatever you want in control cable—Anaconda has it!



PEAK RELIABILITY. Anaconda's Type ANW-rubber-insulated control cable is a high-quality product which features unusual heat resistance. It is also highly resistant to attack by moisture, acids, alkalies and other chemicals. Individual conductor covering and over-all jacket of neoprene.

MULTIPLE USE. Anaconda thermoplastic control cables can be installed aerially, in conduit, underground in ducts—or buried directly in the earth. They are available with either polyethylene (600 or 1000 volts) or Densheath* vinyl resin (600 volts) insulation and Densheath over-all jacket. Also with Densheath conductor covers on request.

OZONE-RESISTANCE. For station control applications where ozone conditions prevail, Anaconda offers a special low-voltage butyl-insulated cable. This control cable not only resists ozone, but individual conductor covering and over-all jacket of neoprene provide maximum insurance against moisture and mechanical injury.

SPACE-SAVER. You can install a 12-conductor cable in conduit now carrying a 6 or 7—with Anaconda Type PND† Control Cable. Individual conductor coverings of moisture-, oil- and gasoline-resistant nylon. Over-all Densheath jacket. Designed for general-purpose control requirements where space is a limiting factor.

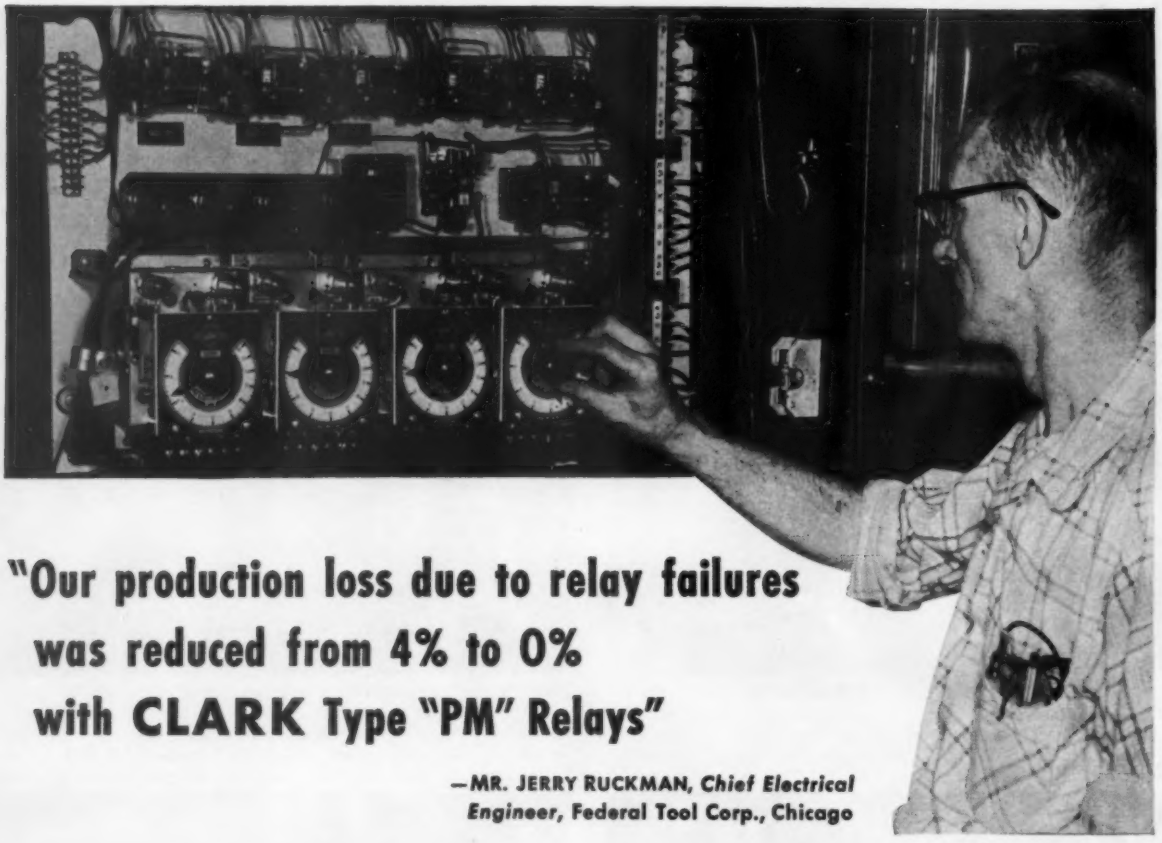
Permanent Full Color Coding on rubber cables, by means of Anaconda's rubber-base coating, assures quick and positive circuit identification. Coding by surface printing, which conforms to IPCEA standards, also available. On thermoplastic cables, full color coding with pigmented insulation and surface printed coding are likewise offered. For information on any of Anaconda's Control Cables—including cables engineered for more specialized control requirements—see your Anaconda distributor or the Man from Anaconda. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off. 57889
†Trademark

SEE THE MAN FROM ANACONDA®

FOR CONTROL CABLE

For more facts circle 585 on Reply Card



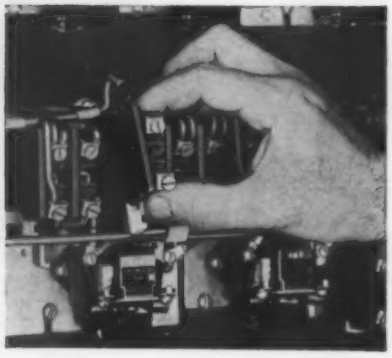
"Our production loss due to relay failures was reduced from 4% to 0% with CLARK Type "PM" Relays"

—MR. JERRY RUCKMAN, *Chief Electrical Engineer*, Federal Tool Corp., Chicago

Explains Chief Engineer Ruckman: "We turn out plastic housewares, haircurlers, toys, premiums and other plastic products by the hundreds of thousands every twenty-four hours. Demand is high. Customers insist on prompt delivery. That's why we were so concerned over the erratic operation of the relays in our molding machine control panels—the heart of our production line.

"We found that non-conductive plastic dust was collecting on the relay contacts, causing them to fail. When this happened, production was halted. Losses amounted to four percent.

"Two years ago we installed Clark Type PM relays, in which each set of contacts is shielded by its own melamine housing. Production stoppages from plastic dust have been cut to zero."



The unique sectional pole construction of the Clark Type "PM" relay offers many other important advantages

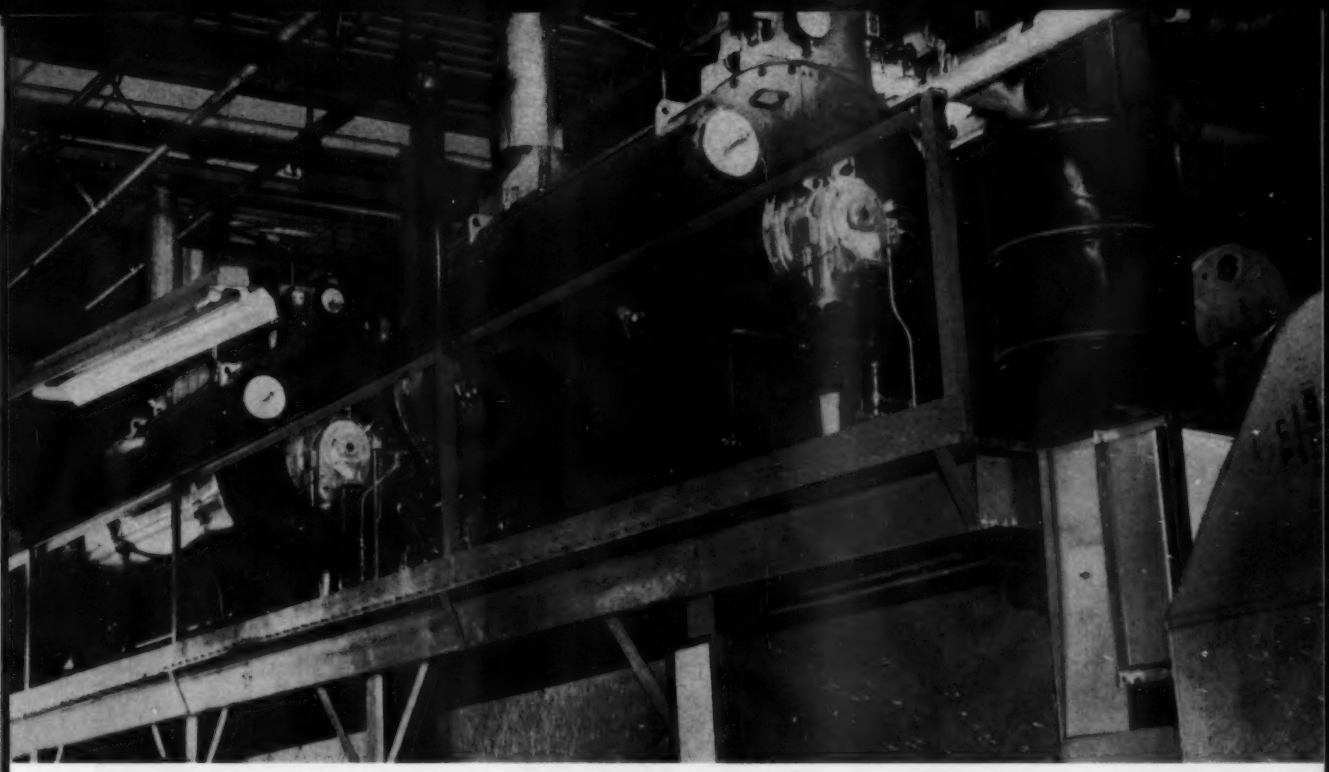
Compact, it's a space-saver. Rugged, it has built-in protection against vibration damage. Simple, it is easy to install and service. Each pole is a self-contained unit that can be removed, installed or replaced without disturbing the others. All terminals are in front for easy accessibility. Each pole has its own individual arcing chamber—a short circuit through one set of contacts is confined to a single pole, and will not destroy the entire relay.

The **CLARK CONTROLLER** *Company*

Everything Under Control 1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

For more facts circle 586 on Reply Card



Powermasters overhead save production space underneath

LOOK AT THESE

***Powermaster*® PLUSES:**

- ★ Low-cost, space-saving installation.
- ★ Fast steaming.
- ★ Instant response to load changes.
- ★ Quick fuel change-overs.
- ★ Clean, dry steam.
- ★ Automatic operating and safety controls.
- ★ High fuel economy at all loads.
- ★ Clean, quiet operation.
- ★ Smokeless combustion.
- ★ One-source responsibility for complete unit.
- ★ Nation-wide, factory-schooled service.

A rubber products manufacturer isn't taking any chances of outgrowing its facilities. Although it has purchased three *Powermaster* Packaged Automatic Boilers since 1952, it still has room for more. Its "boiler room" is an overhead platform in the center of the plant's production area.

The company purchased its first *Powermaster* (60 hp) five years ago. On the basis of this initial satisfaction, it has added two more *Powermasters* (60 and 80 hp) to keep pace with the firm's rapid growth. All three burn natural gas, the area's cheapest fuel.

This novel *Powermaster* installation offers "at least two important advantages", according to the Company's Engineering Director. First, it assures minimum line losses and maximum steam distribution economy because the boilers are installed in the middle of the plant. Second, by using what normally would be waste space, further expansion will be easy and inexpensive.

Before you buy any boiler, get the full *Powermaster* story. Write today for bulletin.

***Powermaster*®**

PACKAGED AUTOMATIC BOILERS

Builders of Dependable Boilers Since 1885

ORR & SEMBOWER, INC.

Morgantown Road, Reading, Pa.

For more facts circle 587 on Reply Card

Interior view of Marathon Corporation's "In Process" Storage building, Green Bay, Wisconsin. PC functional Glass Blocks provide even daylight distribution. Ventilator units, installed in panels, aid warm weather ventilation and permit outside viewing.

23,000 PC Glass Blocks answer Marathon Corporation's need for controlled lighting, heating and maintenance

When Marathon Corporation started plans for its new "In Process" Paper Storage building shown here, company officials took a good look at the performance records of the PC Glass Block panels installed—in 1945—in the adjoining Northern Paper Mill structure.

Reports on this original installation were most favorable. The company found that the controlled daylighting aided worker efficiency, increased comfort. The high insulation value of the panels, and their draft-free characteristics, produced a sharp reduction in heating costs. And the complete elimination of rusting, rotting and painting was another cost-saving advantage.

Added up, these benefits formed a sound recommendation for glass block panels in the new "In Process" building. Plans and specifications were prepared, and 23,000 PC *functional* Glass Blocks were installed.

For product information, see us in Sweet's, or write for our current literature. Pittsburgh Corning Corporation, Dept. PG-107, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor Street West, Toronto, Ontario.

Exterior view shows PC Glass Blocks' contribution to the functional design of Marathon Corporation's new Storage building.

PC Glass Blocks

PITTSBURGH PC CORNING ®

Also manufacturers of FOAMGLAS® insulation

For more facts circle 588 on Reply Card

HANDLING HEAVY STEEL BEAMS in the big yards of a West Coast structural steel fabricator is an American 300 Series Self Propelled Crane. In busy yards, large or small, with wide or narrow aisles, American's fast, easy maneuverability is essential to maintain peak materials handling volume.

YARD CRANE'S SPEED, MOBILITY KEY TO EFFICIENT PERFORMANCE

In large, busy yards, American Cranes meet industry's demand for mobility and speed. No matter what size your yard is, you'll find that this ability to maneuver quickly in tight spots, roll smoothly down aisles pays off in increased materials handling volume.

You can perform *all* yard crane jobs—and many in-plant jobs, too—with these versatile cranes. Bulk handling, loading and unloading, transferring materials, moving equipment, building erection and maintenance work are typical routine tasks! American Cranes give you a choice of interchangeable fronts: crane boom, clamshell, dragline, backhoe, shovel, grapple or magnet!

Power, speed and spotting accuracy set American's fast, productive pace. An optional two-speed transmission, responsive controls and excellent machine balance maintain high safety factors, even with maximum loads!

"Fast, efficient and dependable on every yard job!" That sums up industry's reports on American Cranes. Rugged, job tested design and close quality control in manufacture result in lower operating costs—a fact you can prove by personally talking to owners and operators. Ask your nearest Distributor to show you Americans on the job. You'll find their performance in every industry outstanding. Remember, there's an American Crane in exactly the size and type for your job—on crawlers or rubber, from 12½ to 50 ton capacities!

AMERICAN HOIST
and Derrick Company

Saint Paul 7, Minnesota

For more facts circle 589 on Reply Card

why wonder?

You can be sure you're getting a ready-to-go steam trap when you buy a Nicholson . . . because each and every one is tested in actual steam service before shipment.

And that's not all. With just one thermostatically-operated moving part, there's nothing to get out of order, nothing to go wrong. Nicholson means continuous operation of your steam-using equipment . . . no downtime from trap failure.

- **high air-venting capacity . . . for faster warmup of equipment.**
- **powerful valve action . . . no mechanical linkages to cause trouble.**
- **small and lightweight . . . easy to pipe and support.**

So, to get a trap that's service-tested, and loaded with operating features, specify Nicholson. W. H. NICHOLSON AND COMPANY, 14 OREGON ST., WILKES-BARRE, PA., *Sales and Engineering offices in 98 principal cities.*

Write for Bulletin 1055

NICHOLSON
of Wilkes-Barre

For more facts circle 590 on Reply Card

For more facts circle 591 on Reply Card

this list certainly shows that you will always have plenty of technical assistance when Robertson products are specified.

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BALTIMORE, MD.: °F. P. Bauer, E. Rinehart

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BIRMINGHAM, ALA.: °J. D. Fetterman, Martin Elf, P. A. Hamilton

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ALEXANDRIA, LA., Flynn Building Specialties Inc.

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BUFFALO, N. Y., Arrow Roofing & Sheet Metal Works, Inc.

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CINCINNATI, OHIO, Imbus Roofing Company Inc.

CORPUS CHRISTI, TEXAS, Sechrist-Hall Company

DALLAS, TEXAS, Southwestern Sheet Metal & Mfg. Co. Inc.

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PORTSMOUTH, VA., Craddock Sheet Metal & Roofing Co.

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ST. LOUIS, MO., Mississippi Valley Struct. Steel Co.

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SAN FRANCISCO, CALIF., The Brookman Co., Inc.

SAN FRANCISCO, CALIF., Mitchell Steel Inc.

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Q-FLOOR—the original structural subfloor with electrical availability.

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GALBESTOS—the improved protected metal roofing and siding now available in attractive colors.

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MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

How MICRO SWITCH Trip Controls minimize the unpredictable human factor in industrial accidents

Fast, safe operation of pneumatic press

Guillotine cutter with 2-hand or 4-hand control

Two-hand control of large punchpress

Many factors, such as poor equipment, undependable and restrictive devices, are among the causes of industrial accidents.

But the most important factor is the human factor—carelessness, fatigue, tension, personal problems, and such.

Accident prevention devices that do not restrict freedom of action, that lessen operator fatigue and tension, that inspire confidence, do much to minimize the unpredictable human factor as a cause of industrial accidents.

The MICRO SWITCH Trip Control has done much for the cause of accident prevention. It employs no restrictive gadgets. Its operation requires the use of both hands—both removed from the danger area. Its finger-tip operation reduces fatigue, and its dependability lessens tension and inspires confidence.

It not only boosts morale but speeds up production of manually-operated power machines by as much as 20%. It is acclaimed by Safety Engineers.

See MICRO SWITCH Trip Control
National Safety Show
Booths 163-164

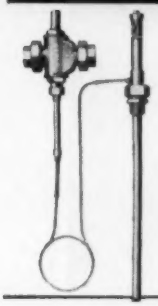
Let us send you complete information on MICRO SWITCH Trip Control and the name of the distributor nearest you. Ask for Catalog No. 65.

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

For more facts circle 592 on Reply Card

Low-cost Temperature Control — by SARCO

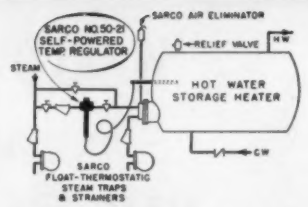
Self-Powered and Electric Indicating



Sarco Temperature Controllers
Self-Powered . . . Fully Modulating

Simple as ABC . . . a thermostat with capillary tubing and a valve. That's all! Operated by liquid expansion. Automatic. Self-powered . . . no electricity or compressed air required. Self-contained . . . no exposed mechanism. Packless valve . . . no stuffing box to leak or stick. Easy to install by any pipefitter.

Furnished with thermostats suitable for any liquid or for air in dryers, ovens, air ducts, etc. Valve sizes . . . ½ to 6". Temperature ranges to 300°F. *Bulletin 620-2.*

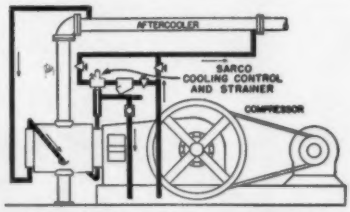


Typical applications: Shell and tube heat exchangers; condensers, oil storage tanks, dryers, etc.

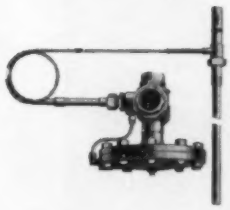
Sarco Cooling Controls
Self-Powered . . . Fully Modulating

Simple, compact, automatic thermostatic valve. Eliminates overcooling and undercooling. Saves water. Overall height of ¾" size is only 17⁷⁄₁₆". Self-powered . . . requires no electrical or compressed air hook-up. Valve and bulb all in one unit. No exposed mechanism. Single-seated packless valve . . . not affected by silt or scale-forming minerals.

Valve sizes . . . ¾ to 1½". Temperature ranges between 40° and 210°F. *Bulletin No. 710-B.*



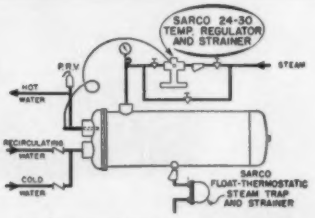
Typical applications: compressors, small engines, water-cooled bearings, condensers, dry cleaning stills, etc.



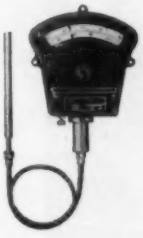
Sarco Temperature Controllers
Self-Powered . . . Single-Seated, Tight-Closing

A simple, self-powered automatic temperature controller with diaphragm-operated, pilot-controlled valve. Designed for intermittent service or service involving long periods with practically no call for steam. Self-powered by liquid expansion . . . no electricity or compressed air needed. Packless.

Valve sizes . . . ½ to 3". Temperature ranges to 300°F. *Bulletin No. 625-B.*



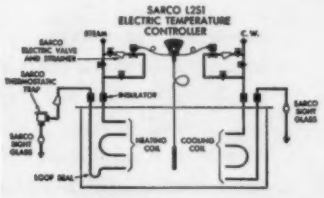
Typical applications: instantaneous heaters, fuel oil pre-heaters, high pressure applications on hot water storage tanks.



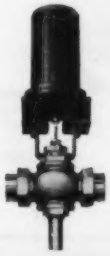
Sarco Electric Temperature Controllers
Indicating Type

Simple, inexpensive, electric-indicating automatic temperature controller. Sensitive enough to perform many of the functions of much more elaborate recorder-controllers, at a fraction of their cost. Responds to changes of ± ½°F. Adjustable. Large, easy-to-read scale shows both actual and set temperatures.

Temperature ranges between minus 90° and plus 650°F. Offers many sequence combinations such as step-heating. *Bulletin 1025-B.*



Typical applications: plating tanks, processing vats, kettles, chemical tanks, etc.



Sarcostat Hydraulic Motor Valves
Electrically Operated

For remote control by hand or thermostat. Open and shut operation. Can be equipped with semi-modulating mechanism. Powerful hydraulic action operates valves up to 5" single-seated, or 8" double-seated, at pressures up to 175 psi. Ruggedly constructed . . . to withstand severe use without constant supervision and with minimum maintenance. Operates in any position.

For direct connection to 110 volts A. C., 60 cycle current. Valve sizes . . . ½ to 5" single-seated; ½ to 6" double-seated. *Bulletin 1080-A.*

UNDIVIDED RESPONSIBILITY

From one "Complete Line" source . . . SARCO-SARCOTHERM . . . for temperature controllers, steam traps and other heating specialties.

2230-B

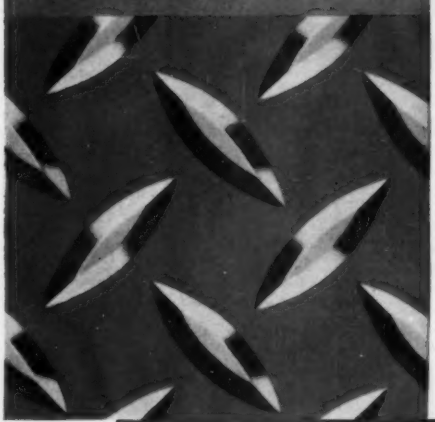
Write for Bulletins to—**Sarco Co., Inc., Empire State Bldg., New York 1, N.Y.**

For more facts circle 593 on Reply Card

WORLD'S LARGEST LADLE CRANE HAS EXTRA SAFETY

WHERE SAFETY COUNTS

Designed for maximum performance, the world's largest ladle crane built by Morgan Engineering Co. can handle . . . in one trip . . . a ladle containing 375 net tons of molten steel. That's efficiency *plus* . . . to which Alan Wood's Super-Diamond floor plate has added *safety!* More than 1,270 sq. ft. of footwalk area on the crane is built of A.W. SUPER-DIAMOND rolled steel floor plate. SUPER-DIAMOND'S anti-slip protection comes from raised diamond-shaped figures . . . alternately spaced at right angles and correct distances. These raised figures give safe foot-gripping from any angle of approach.



Wherever oil, grease or other substances raise special slipping accident hazards, we suggest a check on the special non-slip qualities of A.W. ALGRIP—the world's only abrasive rolled steel safety floor plate.

A.W. SUPER-DIAMOND
ROLLED STEEL FLOOR PLATE

ALAN WOOD STEEL COMPANY • CONSHOHOCKEN, PA.

For more facts circle 594 on Reply Card

time out for breaks?

For coffee, yes. For production equipment, no. And that's where Whitney Chain Drives should enter your planned maintenance program. These husky, heat treated alloy steel chains contribute efficient—durable—economical power transmission or conveying to your production schedules . . . take no time out for expensive shut-downs.

And Whitney's latest chain design advancements are contributing still more to improve efficiency. For example, Whitney's Single and Double Pitch Self-Lubricating Roller Chains outlast regular chains as much as 5 to 1 under rugged field conditions subject to extremes under dust or mud. They also eliminate possible contamination and spoilage on processing equipment where normal external lubrication cannot be applied. These benefits result from Whitney's exclusive sintered steel chain bushings which "oil from the inside" . . . are prelubricated for life.

And Whitney's *fatigue resistant* Processed Roller Chain is establishing new service standards for durability, particularly on problem drives involving unusual operational conditions, stresses and heavy shock loads. This performance comes from the exclusive Whitney *fatigue resistant* process which offsets excessive operational stresses in the chain.

Whitney's nation-wide field engineering and warehousing is backed up by alert Distributors everywhere who have complete stocks of A.S.A. chain and sprockets and *service* to keep your machinery on the go *smoothly*. See your nearby Whitney Chain Distributor now for that time and money saving replacement.

CREATORS OF SELF-LUBE CHAIN

Whitney

CHAIN COMPANY

232 HAMILTON ST., HARTFORD 2, CONN.

ROLLER CHAIN • SILENT CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS

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MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Casters move scaffolding on 550 gallon paint job

It's not easy to paint a huge 100 ft. high structure like this Stewart Mountain Dam in Arizona. The big problem is bringing the painter's scaffold into painting position. The solution here was to paint the dam top to bottom in vertical strips, the width of the scaffold. And when each strip is finished, they roll the scaffold over to the next one on Bassick casters. There's no end to the number of ways Bassick casters can make tough moving jobs easier.

No caster nor tire replacements in 10 years

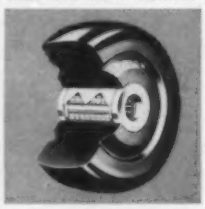
At the Naval Aviation Supply Depot in Philadelphia, Bassick shock absorbing Floating Hub casters have been used on tractor-pulled trailer trains since 1947. They were installed because the rough service damaged regular casters, floors and roadways. Today, ten years later, with rubber-tired Floating Hub casters on all 130 trailers, maintenance men report not one single caster or tire replacement and no damage to floors or roadways. If you have an extremely tough caster job, check on Bassick Floating Hub casters.

New caster wheel 50% stronger

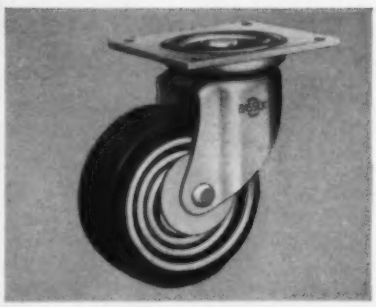
Non-marking "Atlasite" wheel carries heavy loads, won't harm floors.

Developed by Firestone, Bassick's new "Atlasite" wheel is by far the best general purpose all composition truck caster wheel on the market. Here's why:

Impact strength of the new wheel is up 50% over former models. This means that the new standard "Atlasite" wheel will carry heavy loads as easily as a metal wheel but with less damage to floors. It will gradually wear without wearing out the floor. It is quieter than a metal wheel.



And the "Atlasite's" non-marking compound virtually ends danger of black tracks and smudges on floors. Continuing improvement of product quality is why Bassick casters do a better job for you.



Bassick Floating-Hub casters aren't designed only for fragile loads. Shock-absorbing features also equip them for very tough jobs, heavy loads, rough floors, high speeds.

Local industrial distributor saves you money

Your distributor saves you valuable space in your plant that would otherwise be needed for extra and replacement parts by carrying a full line of same in *his* warehouse. For the casters that will best meet your needs, call your local Bassick distributor. The Bassick Company, Bridgeport 5, Conn. *In Canada:* Belleville, Ont.

See our catalog in Sweet's or write for it

7.42

Bassick SYMBOL OF EXCELLENCE

Stewart Warner

MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE

Quality product picks quality caster

Mosler Safe Co. calls their "Revo-File" the "world's finest rotary card file." The casters are Bassick's, naturally. Whether you're buying or manufacturing mobile equipment, remember, Bassick casters are a sure sign of quality. They roll and swivel easily and last longer.

For more facts circle 596 on Reply Card

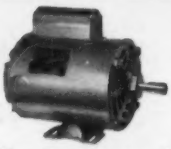
WAGNER ELECTRIC MOTORS...THE CHOICE OF LEADERS IN INDUSTRY

Reduce Down Time—Power your Equipment with *Dependable* Wagner Motors

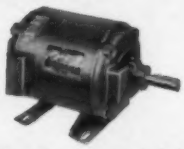
Sixty-six years of experience goes into the building of Wagner Motors. Their reputation for reliability, their electrical characteristics, price and prompt delivery make them a sound choice for your equipment.

Whatever your motor requirements may be—single-phase or polyphase... ⅙ or 500 horsepower—Wagner can offer a standard motor that is entirely dependable in its specific application. A few of the many motors in the Wagner line are shown below.

FRACTIONAL HP



TYPE RK — Capacitor-start Induction. For general purpose applications. Single-phase. Rigid or resilient mounting. 48 frame: ⅙ or ¼ hp. 56 frame: ⅓ through ¾ hp. Also available in integral ratings through 5 hp.



TYPE RA — Repulsion-start Induction. For general purpose applications. Single-phase. High starting torque—low starting current. ⅙ through ¾ hp. Also available in integral ratings through 15 hp.

TYPE RB — Split-phase Induction. For easy starting applications. Single-phase, resilient mounting. 48 frame: ⅙, ¼ or ⅓ hp.

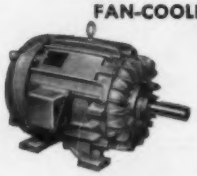
TYPE RP — Polyphase Squirrel-cage Induction. General purpose, normal torque. 56 frame: ¼ through ¾ hp.

INTEGRAL HP

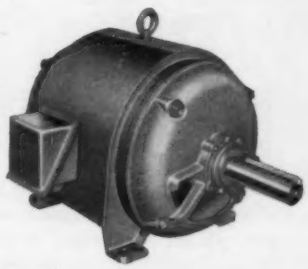
DRIP-PROOF

TYPE DP—Squirrel-cage Induction, corrosion resistant cast iron frames. 1 through 125 horsepower.

TOTALLY ENCLOSED FAN-COOLED



TYPES EP AND JP Standard and explosion-proof. Squirrel-cage Induction, corrosion resistant cast iron ribbed frames, 1 through 30 hp—smooth frames, 40 through 250 hp.



OPEN TYPE POLYPHASE SQUIRREL CAGE

TYPE RP—Drip-proof. Suitable for all general purpose applications. Available in ratings 150 through 500 hp.

OTHER WAGNER MOTORS

In addition to a complete line of standard motors, Wagner also furnishes Increment Type Motor and Starter Combinations... Wound Rotor Polyphase Motors... Jet Pump Motors... Vertical and Flange Mounted Motors... Hermetic Motors... Gear Motors and Direct-Current Motors. Consult the nearest of our 32 branch offices, or mail coupon today for full information on the complete Wagner line.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

M57-10A

Wagner Electric Corporation
6492 Plymouth Ave., St. Louis 14, Mo.
Please send Bulletin MU-185 on your complete line of Motors.

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POSITION_____
COMPANY_____
ADDRESS_____
CITY & STATE_____

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don't lose your head!

When bearings fail, don't go to pieces... get on the phone and tell an authorized SKF distributor your troubles. He will help you put things back in order, quickly. Every authorized SKF distributor carries a complete line of SKF ball and roller bearings and pillow blocks — a type for every use — and he is factory-trained by SKF to assist you on any knotty production problems.

Call him for prompt, reliable service on all bearing requirements.

7788

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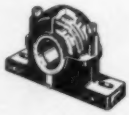
SERIES SY

SERIES FY FLANGED MOUNTING

SERIES SUS

SERIES FUS FLANGED MOUNTING



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SELF-ALIGNING BALL BEARING

SINGLE ROW DEEP GROOVE

ANGULAR CONTACT BALL BEARING

DOUBLE ROW DEEP GROOVE

SPHERICAL ROLLER BEARING

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SPHERICAL ROLLER THRUST BEARING

TAPERED ROLLER BEARING ("Tyson")

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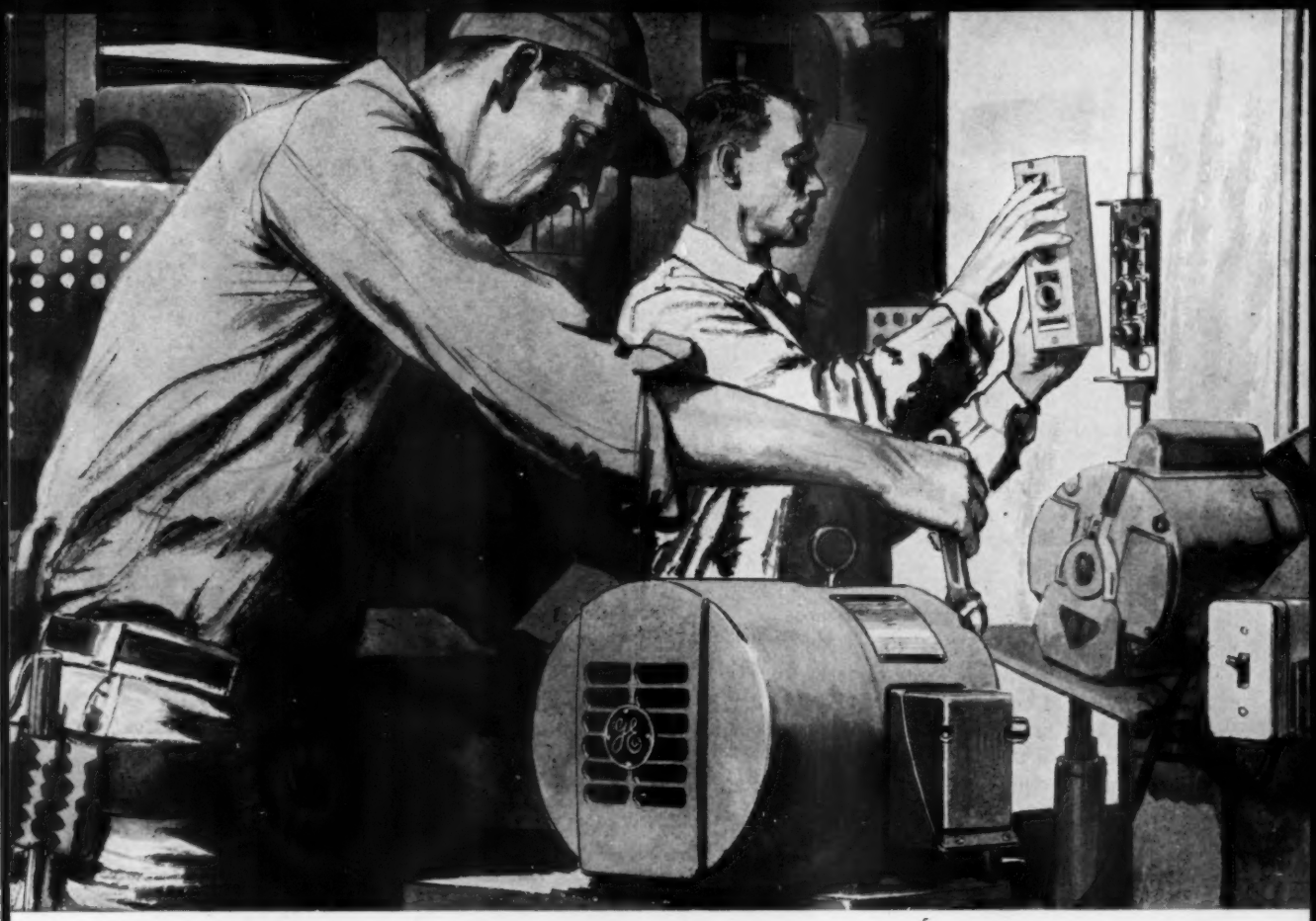
*Reg. U.S. Pat. Off. Tyson Bearing Corporation

For more facts circle 598 on Reply Card



Exactly the right G-E Tri/Clad motor in type, speed and power for every drive job is ready for you through any Graybar location. Through this same convenient source you can get experienced help in picking the right controls. To insure perfect selection you don't need to know all about all controls. Just know — and use — the phone number of your nearest Graybar office.

How to pick the one best MOTOR and CONTROL for any power drive in your plant

In a single department your plant may have several different motor problems. High starting torque may be needed in one case, constant speed in another. And many times, motors have to work dependably in dusty, dirty air. For each job, and for every other motor drive need, there is one best G-E Tri/Clad motor to do the work with complete satisfaction. And matching control. For precise selection and prompt, friendly help you or your electrical contractor can rely on Graybar.

Through more than 130 Graybar offices and warehouses you have conveniently available motors, controls and over 100,000 electrical items. Further, Graybar Specialists, strategically located throughout the United States, are ready and willing to give you or your electrical contractor the full benefit of their broad experience in motors, control, wiring, lighting, ventilation, electronics and communication. When you need help or advice, scheduled or emergency shipments on *anything electrical*, always CALL GRAYBAR FIRST.

740-3210

These two bulletins give you valuable help in the selection of motors and controls for specific jobs. Send now for your copies.

CALL **GraybaR** FIRST FOR

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

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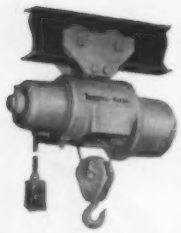
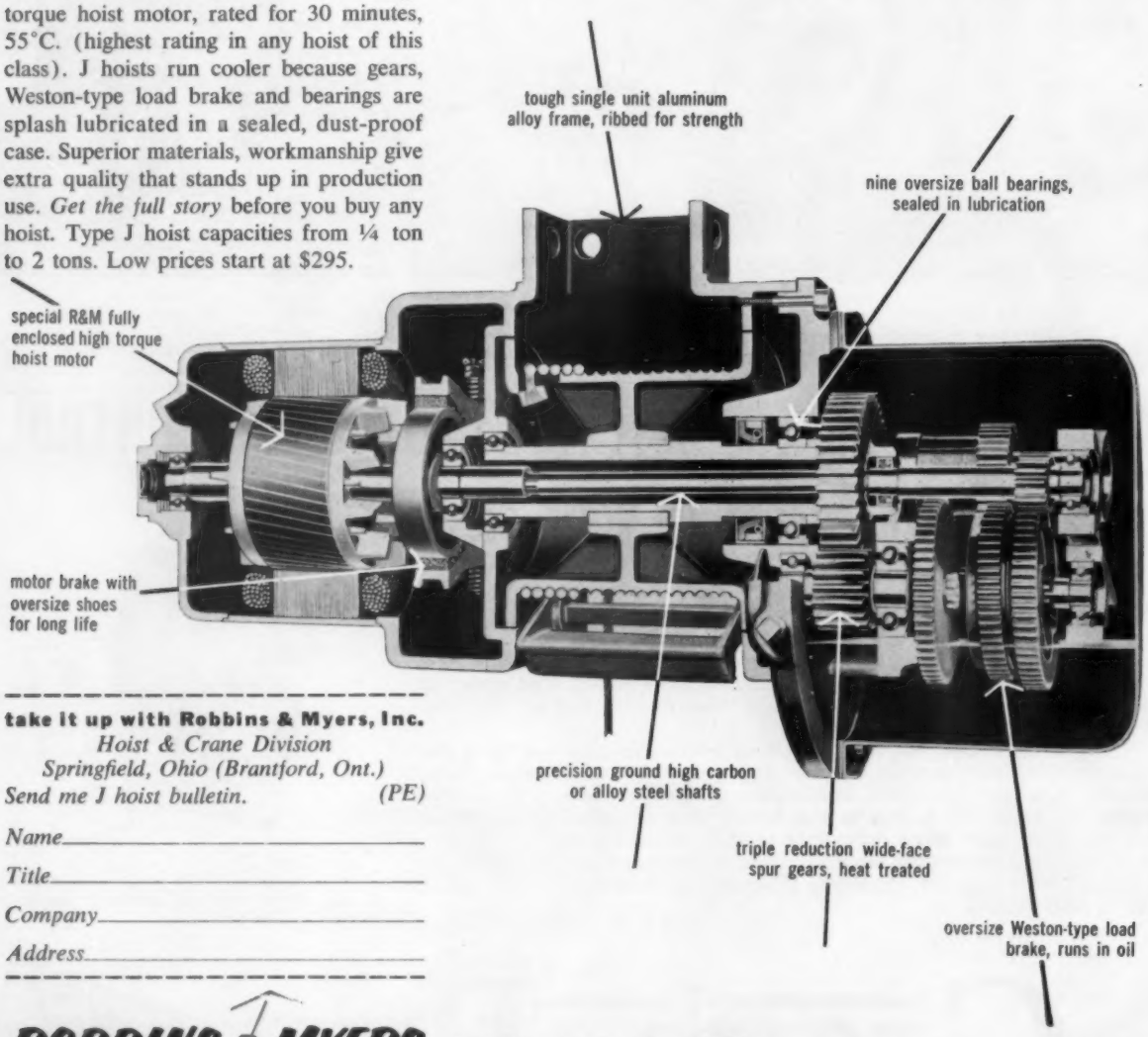


R&M J hoists give you the biggest quality lifting package at a reasonable cost, and here's why: First, there's no compromise on material—high strength carbon or alloy steel shafts and gears; tough, flexible plow steel cable; oversize bearings, load brake, and shafts—all last longer under punishing loads. No compromise on workmanship, either—each of the triple reduction spur gears is wide-faced, precision cut and heat treated; the motor is R&M's own high torque hoist motor, rated for 30 minutes, 55°C. (highest rating in any hoist of this class). J hoists run cooler because gears, Weston-type load brake and bearings are splash lubricated in a sealed, dust-proof case. Superior materials, workmanship give extra quality that stands up in production use. *Get the full story* before you buy any hoist. Type J hoist capacities from ¼ ton to 2 tons. Low prices start at $295.

buy value you can see


tough single unit aluminum alloy frame, ribbed for strength
nine oversize ball bearings, sealed in lubrication
special R&M fully enclosed high torque hoist motor
motor brake with oversize shoes for long life
precision ground high carbon or alloy steel shafts
triple reduction wide-face spur gears, heat treated
oversize Weston-type load brake, runs in oil

take it up with Robbins & Myers, Inc.
Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)
Send me J hoist bulletin. *(PE)*

*Name*_____

*Title*_____

*Company*_____

*Address*_____

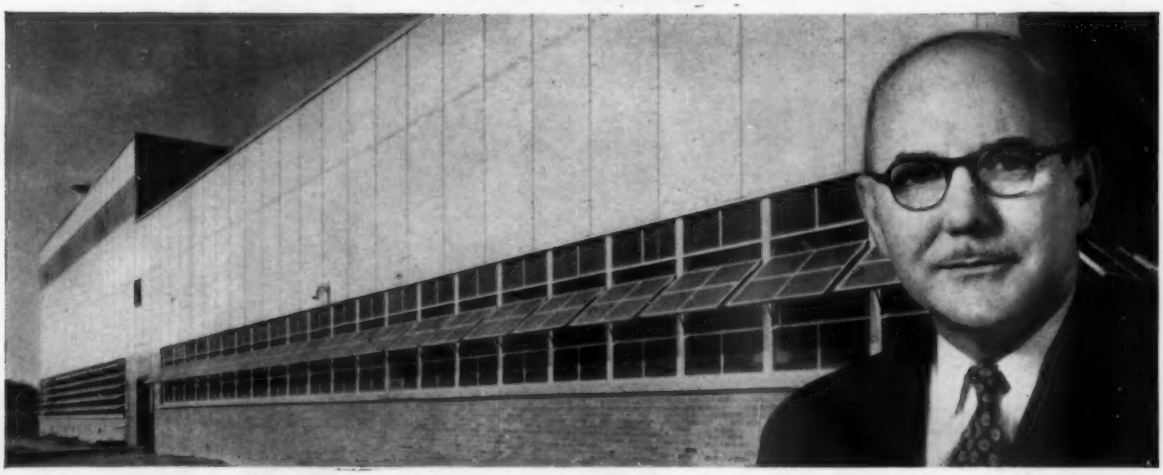
ROBBINS & MYERS hoists • cranes • winches

For more facts circle 600 on Reply Card

"LURIA SAVED SNAP-ON TOOLS CORP. 10%

. . . full responsibility for construction, plus time-saving ideas, kept costs low."

WILLIAM C. NEMITZ, TREASURER



"DELIVERED NEW PLANT 6 MONTHS AFTER AWARD OF CONTRACT...

. . . helped us relieve congestion in existing plant and gave us more efficient production operation."

A. M. JENSEN, VICE PRESIDENT, MANUFACTURING

Architectural distinction, combined with a modern production layout for such diverse operations as forging, automatic screw machining, plating and packing, was what Snap-on Tools Corporation demanded in their new 44,000 sq. ft. plant and offices at Mt. Carmel, Ill.

What's more, they wanted the plant *fast* – to help relieve congestion in their existing plant and to provide needed capacity for relocation of production from other plants on a more efficient basis. A call to Luria provided the answer—a complete building package with many valuable innovations delivered only 6 months after awarding of the contract. Full responsibility by Luria for architectural and engineering services as well as for fabrication and construction saved Snap-on's Engineering Department considerable time, work and expense. And Luria's methods of construction, together with its complete steel stocks and modern fabrication facilities meant further savings. The Snap-on Tools Corporation not only got their building quickly but also saved an estimated ten percent.

The comments of Snap-on executives quoted here tell their own story. Luria can perform similar services for you. For further information, call the Luria representative in the cities listed below. Or call LURIA ENGINEERING COMPANY, 511 Fifth Avenue, New York 17, New York.

LURIA MEANS FULL RESPONSIBILITY

DISTRICT OFFICES: ATLANTA • PHILADELPHIA • BOSTON • CHICAGO • NEW YORK • WASHINGTON • PITTSBURGH • RICHMOND • DAYTON

PLANTS: BETHLEHEM, PA. • CHICAGO HEIGHTS, ILL.

For more facts circle 601 on Reply Card

Best Way to Start a New Plant or Warehouse:

Specify straight-driving, easy-to-inspect

Armco Foundation Pipe

Here is a foundation HEADQUARTERS — from which you can specify an Armco Foundation Pipe to meet practically any foundation need.

ARMCO Pile Shells

These lightweight, helically corrugated shells provide an economical pile shell. They are mandrel-driven, and are available in 16 different diameter-wall thickness combinations. Lengths to 60 feet.

ARMCO Pipe Piles

Available in lengths up to 90 feet, Armco Pipe Piles provide an extremely straight-driving pile that can be checked for alignment and watertightness after it is in the ground. Easy to splice and weld on short cut-off sections. No Waste. Diameters range from 8⅝" to 22"; wall thicknesses from .141" to .500".

ARMCO Caissons

The largest of Armco Foundation Pipe Products, Armco Caissons are available in diameters from 24" to 36"; wall thicknesses from .375" to .500". Caissons can be shipped in lengths up to 70 feet.

Composite Piles

Frequently, special conditions call for a foundation pipe that combines the qualities of both a pile shell and pipe pile. Or, pile shell may be combined with timber. The wide range of types and sizes of Armco Foundation Pipe makes it easy to meet your composite pile needs—exactly.

Write us, outlining your foundation plans. We'll be glad to work with you to find the economical answer with one or more kinds of Armco Foundation Pipes. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 5707 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO FOUNDATION PIPE

For more facts circle 602 on Reply Card

Mister, you're looking at a panelboard that's really built for Heavy Duty!

The heart of this QMB Saflex Distribution Panelboard is the quick-make, quick-break, horsepower rated switch unit.

It's loaded with features—

- Each switch unit individually enclosed in heavy gauge steel
- Dead front construction
- Heavy duty cast operating handle
- Double-spring mechanism insures positive opening under full load
- Visible blades for maximum safety
- Positive pressure fuse clips and switch jaws assure maintenance-free connections
- Cover interlock prevents unauthorized access but makes normal maintenance easier

QMB Saflex Distribution Panelboard

Here's a panelboard that's built for the tough jobs! But it goes a lot further than rugged construction. It's designed with plenty of space for easier wiring and maintenance.

Write for...

Bulletin S D-29 for further information
Address: Square D Company,
6060 Rivard Street,
Detroit 11, Michigan

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

For more facts circle 603 on Reply Card

For Full Power when it's needed most, specify **gould** batteries...

Gould Industrial Truck Battery —America's Finest

Here's why: You know that an overload can cause an unusual drain on your batteries. At such times your batteries must be in "good health" or they may not survive the strain. Keeping batteries in "good health" is not difficult, all it takes are good routine checking procedures which give you a day-by-day record of a battery's condition. By consulting these records frequently you can always be sure of full power when it's needed.

An important part of the Gould service is to help you establish such a sound preventive maintenance program, and teach your battery maintenance personnel the importance of following recommended procedures. This is another reason why it pays you to specify Gould. Want more reasons? Write for booklet "... so you're going to buy an industrial battery." Gould-National Batteries, Inc., Trenton 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

More Power to you from Gould

© 1957 Gould-National Batteries, Inc.

For more facts circle 604 on Reply Card

Only New HALLOWELL *ERECTOMATIC*® Steel Shelving

has a time-saving, positive built-in lock—plus these features:

FAST ASSEMBLY. Just position the shelf supports, insert the shelf, press the locks. Straight-in, straight-out shelf change. No tilting. No dismantling. No interference with any other shelf.

New Hallowell ERECTOMATIC® steel shelving goes up fast, can be rearranged in seconds. It's the unique built-in locking device* that cuts assembly time, speeds repositioning of shelves. Here's how easy it is! To position a shelf—slide it into place on the shelf supports, press the locks, and the job is done. To reposition a shelf—release the locks, pull the shelf straight out, slide it straight in on the supports at its new location, and press the locks. It takes only seconds to complete the move.

New Hallowell ERECTOMATIC steel shelving is available in all types, too. Open, closed, bin units, ledge units, counter units, and cabinets are made of prime steel, phosphate coated, and finished in baked-on enamel. Standard is SPS green, other colors are available.

Investigate new Hallowell ERECTOMATIC before ordering shelving. You'll find it stocked by leading industrial distributors and shop equipment dealers everywhere. Contact the one nearest you. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

*Patent applied for

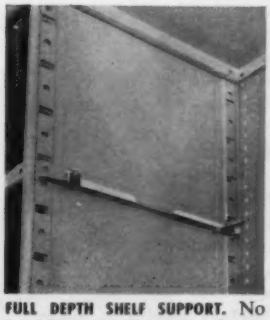
INDEPENDENT SHELF POSITIONING. Each shelf can be individually repositioned in seconds.

FULL USE OF SHELF AREA. No tees or angles, and beaded posts save valuable space.

COMMON SIDE PANELS AND POSTS save material between adjacent units in rack. Back and side panels are one-piece.

BEADED POSTS AND FLANGED SHELVES prevent snagging of clothing or stored goods, protect workers.

QUICK SHELF CHANGE. Release the locks, remove the shelf and its supports, relocate, and press the locks.



FULL DEPTH SHELF SUPPORT. No buckling possible. Reinforcements can be added when they are required.

4 CLASSES OF SHELVES. Regular, medium, heavy and extra-heavy construction meets all load requirements.

HALLOWELL® SHOP EQUIPMENT DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

For more facts circle 605 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards provided on pages 275-276 to ask for more information on these products. Circle item numbers of products in which you are interested.

1—LIGHTING-CEILING affords greater design freedom

Developed to provide a single system which incorporates lighting, acoustical control and structural header sections to receive movable partitions, this company's integrated lighting gives freedom to place ducts, feeds, pipes,

sprinklers and other services above the system without predetermined pattern. This is possible because the system is in effect, a large grid-work positioned below all structural members of the building and the services. This grid-work forms an open-type dropped ceiling which takes advantage of the height above the system to convey a feeling of loftiness.

The lamps, which operate in space, stay cleaner longer, manufacturer states. Visual comfort of the system is accomplished by the low brightness of the lamps (operated on 120 ma) and by shielding of the transverse members of the grid systems which provide 45-deg shielding perpendicular to the lamps. Transverse members of the grid system consist of perforated metal shells containing a fiber glass filling for acoustical correction. Longitudinal members of the grid contain lamp wiring. Smithcraft Lighting.

2—WIRE PARTITIONS afford increased layout flexibility

Offering a modern, economical approach to plant layout problems, each panel in these wire-mesh partitions is a complete unit, interchangeable and moveable, and can be quickly assembled and installed. Partitions are reusable, and can be disassembled and relocated as plant layout changes require. The low cost, company states, is made possible through standardization and large run production of the units. Available in two types of construction—all mesh, and mesh-with-steel base—the panels can be supplied as standard units 8 ft high, and in widths of 4 or 5 ft. When greater height is required, standard top panels are available for increasing over-all height to 9, 10, 11 or 12 ft. Accessories include various doors and service windows. Wire and Iron Products, Inc.

3—LIQUID LOCK WASHER sets up bolts and nuts

Loctite Sealant, a liquid plastic, sets up nuts and bolts so securely that no amount of vibration will shake them loose, manufacturer states; yet they can be removed with ordinary tools. It is said to give up to five times the removal torque of lock washers and lock nuts. Already in use in production applications, the sealant is now available in kit form for use in maintenance and repair work. This thread locking kit contains five plastic bottles of the sealant, each with dispensing nozzle, for easy application to the assembled bolt or nut. Because it is a thin liquid, it wicks into spaces between the threads without need for removing the fastener, it is explained, and thus equipment can be made vibration proof without disassembly. A series of grades of different strengths lets you choose the proper locking torque for job. American Sealants Co.

4—TRANSMISSION BELT operates at 100,000 rpm

Rusco Ultra-Speed M is announced as a flexible high speed transmission belt capable of operating at speeds up to and above 100,000 rpm over pulleys as small as ⅜ in. diam. This thin, flat belt is a blend of stretch-resistant synthetic and natural fibres, inseparably bonded together to form a strong, flexible belt. Although belt was developed for ultra speed transmission, it can be used at any spindle speed. In a field test, it was operated successfully at 100,000 rpm for 2100 hr, company says, over a 7/16 in. diam pulley. The Russell Mfg. Co.

5—IMPACT WRENCH, high capacity, for heavy duty

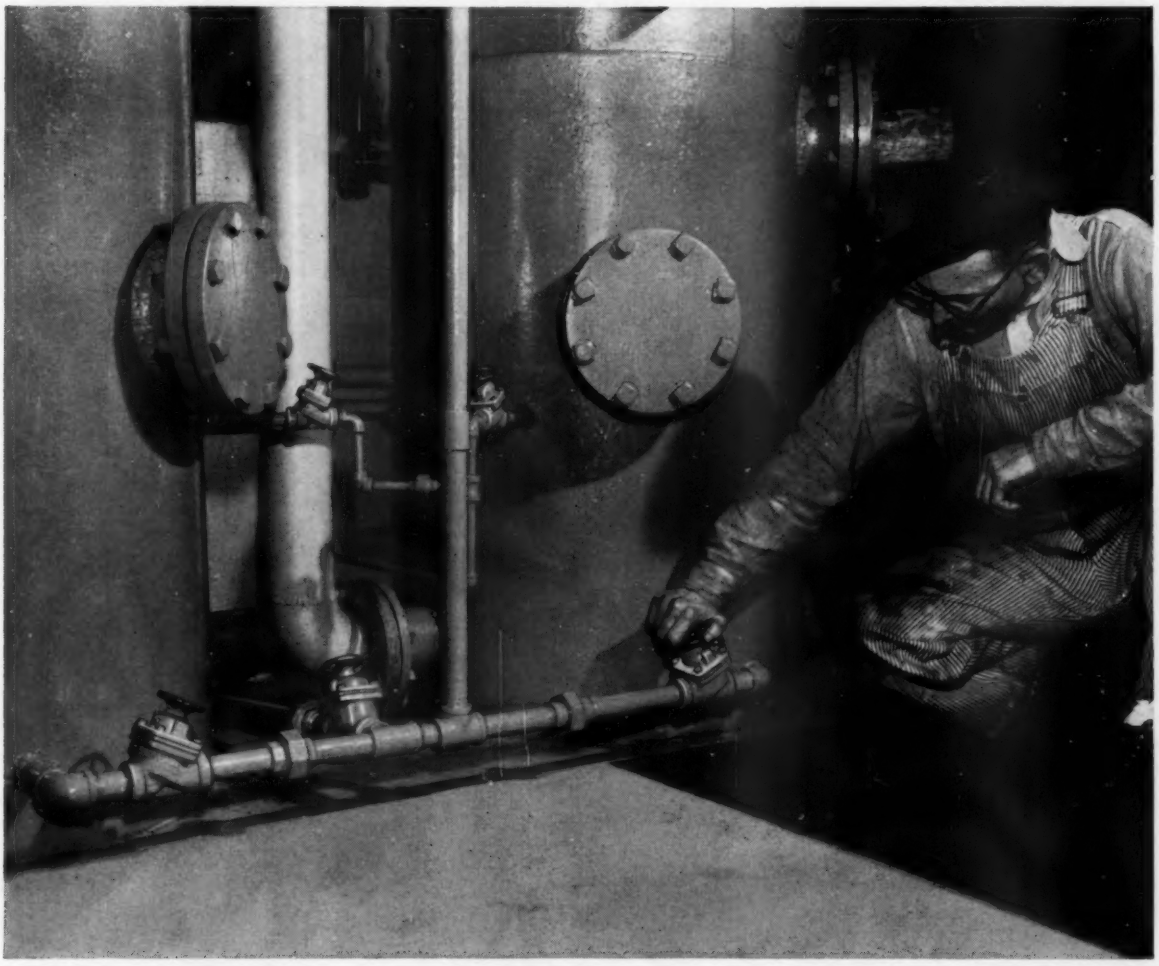
Offering a torque range of 300-450 ft-lb, the No. 300 Impact Wrench augments company's No. 100 Impact Wrench as a higher capacity tool of equal quality for heavy-duty construction, maintenance and repair

work. The No. 300 is built for rugged wear—has die-cast aluminum housing, lubricant-sealed ball bearings, and heat-treated gears. Powered by a motor for a-c d-c use (available for 115 or 220 v), the tool is claimed ideal for large, heavy nut running of ⅞-in. diam and up, as well as for cap and lag screw driving and removal. A centrifugal fan and ventilating system contribute to cool operating temperature. This wrench is designed to reach maximum torque in 6 sec. The Black & Decker Mfg. Co.

6—WALL FINISH for freezer room insulation

Adcote is specially designed for finishing board type insulation, principally in low temperature freezer and cooler rooms. It is supplied as a two component product—a dry powder and a liquid which are mixed just prior to use. The material is normally applied by trowel, although successful applications by brushing and by spraying with special equipment are reported. On most surfaces Adcote is usually applied in two coats to a total thickness of ⅛ in. It can be finished in varying degrees of smoothness. Painting is not necessary. Adcote is white, but may be tinted before application. Instal-

How Liquid Carbonic stopped potassium permanganate leakage



700% longer service with these Crane valves . . . still going

This case history could save money in your own operation.

Liquid Carbonic Corporation, Seattle, Wash., is using these Crane packless diaphragm valves to handle potassium permanganate in lines to scrubbers. Before installing Crane No. 1610 ½" and 1" valves, this dry ice plant had to replace valves of another make at least every 6 months. Constantly recurring leakage around stems called for frequent stuffing box maintenance and hindered operations.

Since changing to Crane packless diaphragm valves, there has been no leakage, no trouble of any kind in 3½ years. Valve service is already 700% better. Here's why: Crane packless diaphragm valves completely eliminate the need for stem packing and the problems of stuffing box leakage and maintenance. The diaphragm seals the bonnet from line fluids.

Make sure your valves have correct design, better materials, precision assembly, thorough testing . . . insist on Crane, from the world's largest, most complete line of valves and fittings for industry.

ASK your Crane Representative for Crane Folder AD-1942 on packless diaphragm valves, or write Crane Co., address below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855 — Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

For more facts circle 606 on Reply Card

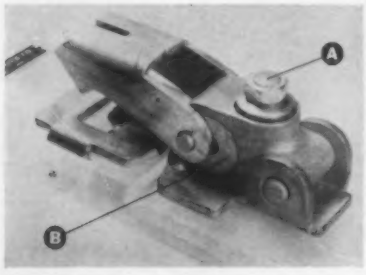
NEW PRODUCTS

(Begins on page 200)

lations are reported to show good whiteness stability, and no yellowing. Resistance to moisture, chemicals, vermin, rodents and mold is excellent, says manufacturer, and the material is highly fire retardant. Applications other than on insulation, include refinishing interior concrete surfaces, or brick walls. Swift & Co.

7—CLAMP for sealing the heavy-duty containers

Gear-Lock is a worm-gear-actuated clamp claimed capable of providing an air-tight, moisture-tight seal in steel, aluminum, plastic or other containers. Advantages announced include an ultimate closing strength up to 2000 lb, ability to continually withstand shock and vibration, infinite adjustability to accommodate varying



manufacturing tolerances, and economies in labor costs of mounting, opening and closing. Operating principle is simple. Rotation of the locking nut with a standard 7/16 wrench (A) turns gear (B) by the work lock principle and closes clamp. Existing designs incorporate external, internal and external-recessed clamping methods. By utilizing the central work gear mechanism, a combination of links, bases and striking surfaces can be worked out to almost any specific application. The Bassick Co.

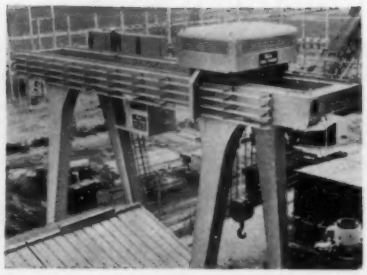
8—TOTE BINS for the intraplant handling

These carbon steel, hermetically-sealed tote bins are designed for intraplant handling of bulk materials where product contamination and container corrosion are not considered factors. The carbon steel container is not recommended where product carried may react with material of construction, where bin will be stored outside, or where it will be used in interplant operations. The carbon steel containers come in five sizes from 42 to 110 cu ft. Tote System Inc.

9—HOIST CONTROL for gantry and bridge cranes

Applicable to both gantry and bridge cranes, the Paceco Dual Torque is designed to eliminate an auxiliary hoist —one hook provides speed with light load and power with heavy load. This new hoisting concept is claimed to lower first costs, reduce maintenance costs, save operating time and increase efficiency. Advantages announced include dual capacity and speed with one set of hoisting and electrical equipment, constant torque and speed, irrespective of load on any operating point, hoisting and lowering smoothly in increments of 0.005 to 0.010 in. and a magnetic amplifier with d-c shunt motor field weakening.

This control applies advantages of variable voltage and shunt field weakening to eliminate need for an auxiliary hoist and attain high speed operating of main hook under light or no load conditions, it is noted. To achieve this, many systems require motors four times the size of Paceco Dual Torque motors, manufacturer explains. Dual Torque combines constant speed load characteristics of the shunt motor with a 4:1 speed range. The design is also said to permit hoisting in increments of 0.005 to 0.010 in. Pacific Coast Engineering Co.



10—VAPORIZING VALVE controls expansion of vapors

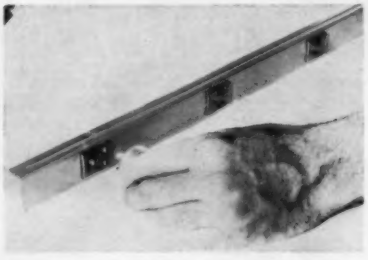
Model I Vaporizing Valve is intended for controlling expansion of vapors such as those in refrigeration systems, petroleum refineries, and chemical plants. Valve is designed to permit controlled expansion of condensable vapors with volume expansions up to several thousand to one, while maintaining intimate thermal contact with room ambient. Condensation is minimized or prevented entirely, says manufacturer. The radial input aperture is controllable in microinches. Units with electric heaters and those for automatic control are also available. Manufacturers Engineering & Equipment Corp.

11—BOILER CLEANSER works without flushing, draining

This liquid rust destroyer and conditioner can be used for all types of hot water and steam heating systems without flushing or draining. One application is reported to dissolve oil and grease, remove rust, scale and sediment and prevent new rust from forming. An antifoam additive in the product acts to prevent priming or surging in the system. Completely soluble, the product is claimed not to clog valves or drains. It is poured or pumped into heating system through boiler drain or other openings. Then the system is operated normally to circulate cleanser and conditioner throughout boiler and piping. For all hot water heating systems, one quart is used for each 200 sq ft of radiation or one quart for every 10 gal of water in boiler and piping. Steam or vapor systems require a quart for each 400 ft of radiation. Crest Mfg. Co.

12—POWER OUTLET STRIPS for the shop benches

Wiremold electric outlet sections, which can be installed on any of this manufacturer's Hallowell line of shop benches, are pre-wired and complete. It is only necessary to bring in lead-in wiring of armored cable or conduit for the bench to be electrified. Sections are UL approved for 15A, 125-v service, it is announced; the Wiremold sections provide individually-grounded



two-wire NEMA receptacles with three-prong, double-wire contacts every 6 in. Strips can be mounted to lie flat along either vertical or horizontal surfaces on the front or back of the resinwood, pressed-wood, laminated wood or metal bench tops. Standard lengths for sections are 49-⅜, 61-⅜ and 73-⅜ in., a little longer than corresponding bench lengths to accommodate lead-in wiring, but can be trimmed to bench length. Standard Pressed Steel Co.

13—ROTARY AIR MOTOR with reversible feature

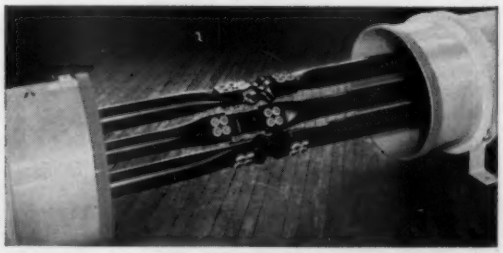
Model 6AM is a rotary air model for original equipment or plant use in the ½- to 2-hp range. On such applications as machine tool positioning, pneumatic hoists and materials han-

NONSEGREGATED PHASE BUS

. . . completely sealed, air and porcelain insulated

I-T-E adds another first to its achievements in the design and development of bus structures—4.16, 7.2 and 13.8 kv., 1200-3000 ampere nonsegregated phase bus that is completely sealed and air and porcelain insulated. No organic materials are used for insulation. Cork neoprene-gasketed split-half round covers provide a completely sealed bus that can be used indoors or outdoors; bare copper or aluminum conductors are mounted on purified porcelain which has high dielectric strength, is inherently contamination free. The entirely new design has other outstanding advantages, too. The circular design permits installation in much less space. Flexible or laminated connectors make unit sections easier to install.

I-T-E nonsegregated phase bus is ideal for generator leads to transformers, for connecting transformers to switchgear assemblies, for interconnecting switchgear assemblies, and for distribution of light and power in factories and office buildings. For complete information on this new I-T-E product, contact your local I-T-E sales representative. Or write I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.



COMPLETELY SEALED, AIR AND PORCELAIN INSULATED DESIGN eliminates organic insulating materials, permits use indoors and outdoors. Circular construction permits installation in much less space, provides optimum performance—mechanically, thermally and electrically. Laminated connectors provide unusual flexibility, simplify installation. Also compensate for expansion and contraction in service.

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

IN CANADA: EASTERN POWER DEVICES LTD.

For more facts circle 607 on Reply Card

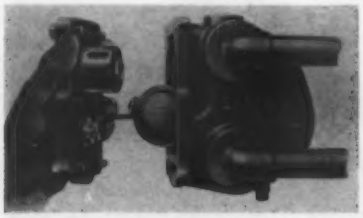
NEW PRODUCTS

(Begins on page 200)

dling equipment, the reversible rotation feature is advantageous. Manufacturer says that any four-way operating valve built for pressures below 100 psi may be inserted in the air supply line for instantly reversible motor control. Motor ports fit ⅜-in. standard pipe. Models with single rotation, right or left, are also available. All models are described as weighing about 17 lb, are explosion-proof and variable in speed from 300 to 2000 rpm on air line pressures from 30 to 90 psi. Bulletin 457-50 contains data. Gast Mfg. Corp.

14—STEAM TRAP with single-unit, removable element

Increased accessibility of the Type F-T Float-Thermostatic Steam Trap facilitates inspection, maintenance and installation. The entire operating element is one unit, which can be removed without disturbing inlet and outlet connection to the semi-steel trap



body, suitable for 125 psi steam pressure. Operating elements consist of stainless steel valve mechanism, copper float, and bronze thermostatic air vent. Valve is designed to provide condensate seal and prevent loss of steam to discharge condensate at steam temperature continuously and without shock. Separate air vent, requiring no adjustment when pressure changes, serves to remove air and incondensable gases, allowing no steam to escape. Trap is suggested for unit heaters, blast coils, heat exchangers, and other allied process applications requiring accurate temperature control. Sarco Co., Inc.

15—BEARING MATERIAL requires no lubrication

For applications where lubrication is a problem, this composite bearing material, Chemloy, is suggested for dry bearing services, both sliding and rotating at temperatures to 500 F. Due to its properties, company says, it is ideal for use with solvents, such as acetone and practically all types of corrosives. It is also reported excellent for applications subject to impact, since it does not permanently deform due to shock of importance in mechanical linkage assemblies, where constant, vertical and horizontal impact is present. Chemloy has a static or kinetic coefficient of friction against polished steel of only 0.04 and a P.V. factor up to 10,000. It is said to withstand speeds up to 1000 fpm and loads to 100 psi. Crane Packing Co.

16—ROOF COATING has all-weather applicability

Both a wet surface roof coating and roof cement, this product gives the same protection from leaks as ordinary asphalt roof coatings. In addition to the primary advantage of all-weather applicability, it does not require special handling in freezing weather. Due to its improved formula, which incorporates a special additive, the wet surface coating is said to form a more durable bond for all surfaces, wet or dry, than afforded by many roof coatings. Besides functioning to displace water from the surface of moist roofs upon application, the asbestos fibre it contains also is so composed as to eliminate settling in its container. Application can be made with a heavy duty brush or sprayed on, to assure a good heavy duty film and new life for weather-beaten, dried-out roofs. The Warren Refining & Chemical Co.

17—PUMPING UNIT for transfer of coolants

Furnished with company's Model PP-2M, ¾ in. bronze pump, this portable unit is equipped with phenolic or Neoprene impellers, carbon bearings and split Teflon-asbestos packing rings.

Driven by a ⅓ hp heavy duty motor, pump has a capacity to 10 gpm and pressures to 75 psi. Weighing 55 lb complete and measuring only 24 in. long by 17 in. deep, the pumping unit is suited for movement in narrow quarters. The dolly is mounted on rubber wheels. The unit is priced at about $130, including 10 ft of grounded cord. Eco Engineering Co.

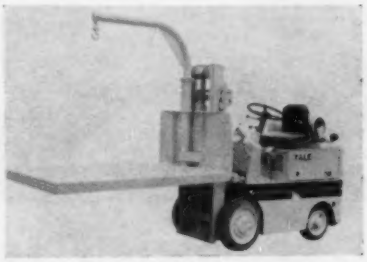
More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 275-276.

18—SOCKET END VALVE of polyvinyl chloride

The Luncor Fig. 2601 is a socket end valve readily installed in PVC lines by solvent welding. This is a fast and easy method of connecting PVC valves to pipe and produces high joint strength, according to manufacturer. The new polyvinyl chloride valve is rated 125 psi working pressure and 140 F. The Lunkenheimer Co.

19—PLATFORM for the overhead maintenance jobs

This workman's platform and boom attachment for industrial lift trucks is designed for overhead maintenance tasks involving bulky or heavy pieces of plant equipment. The platform comprises 24 sq ft of working area and can

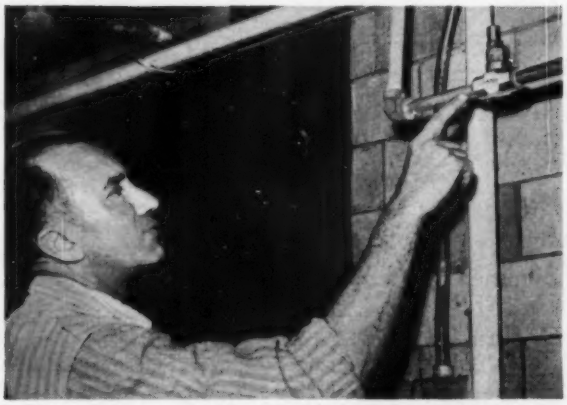


be fitted with a removable guard rail for safety. The attachment's removable boom, fitted with a hook which accommodates a hand hoist or ratchet hoist, has a capacity of 300 lb and slews through 180 deg. The boom outreach is 48 in. This attachment is designed to fit directly onto a standard fork carriage. It can be modified to be picked up on a pair of 48 or 60 in. long forks so that the truck can serve double duty as a production tool and piece of maintenance equipment. The Yale & Towne Mfg. Co.

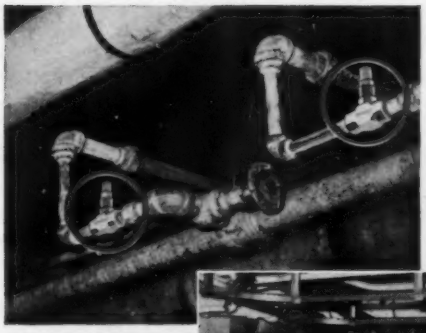
20—MERCURY LAMPS come in four 1000-w types

Four new 1000-w white mercury lamps are announced as providing nearly 5 per cent more light than previous models. Application of a special phosphor as an internal coating to four models of 1000-w bulged tubular shaped lamps has produced this efficient mercury light source, according to manufacturer. This strontium mag-

"these steam traps save us 30,000 gals. of fuel oil a year"



Yarways are responsible for cutting our fuel oil bill 20%



We have Yarways on steam coils for all our smokehouses

Q. Mr. Melcher*, you've been using Yarway Impulse Steam Traps in this packing plant for over two years. What's your experience?

A. It's all been good. As a direct result of changing to Yarway Traps we save 30,000 gallons of fuel oil a year—or about 20% on our oil bill. Temperatures now stay hot and steady.

Q. Where do you have these Yarway Traps installed?

A. On all the steam coils for the smokehouses, heating exhaust fans and hot water generators.

Q. How about maintenance?

A. We haven't touched a Yarway Trap in the two years we've had 'em. With only one small moving part, there's not much to go wrong. Previously, with other traps, we averaged over $300. a year for trap maintenance.

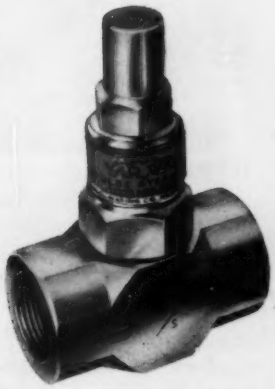
Q. You'd recommend Yarway Impulse Steam Traps, then?

A. I don't have to. The record speaks for itself!

If you'd like a copy of a new booklet, "The How and Why of Steam Trapping", drop a card to

YARNALL-WARING COMPANY
145 Mermaid Avenue
Philadelphia 18, Pa.

*GEORGE E. MELCHER,
Chief Engineer,
large eastern meat packing plant.



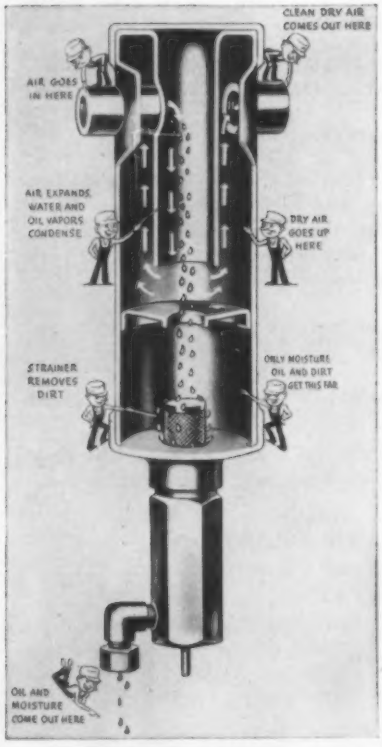
YARWAY impulse ...a good way to specify steam traps

OVER 1,200,000 YARWAY IMPULSE STEAM TRAPS ALREADY USED • STOCKED AND SOLD BY 275 CONVENIENT LOCAL INDUSTRIAL DISTRIBUTORS • NATION-WIDE YARWAY ENGINEERING STAFF AT YOUR SERVICE.

For more facts circle 608 on Reply Card

TROUBLED
with MOISTURE
OIL VAPOR
DIRT or SCUM
in your COMPRESSED
AIR LINES?
install

Dexter
AUTOMATIC
SEPARATORS


CLEAN DRY AIR COMES OUT HERE
AIR GOES IN HERE
AIR EXPANDS WATER AND OIL VAPORS CONDENSE
DRY AIR GOES UP HERE
STRAINER REMOVES DIRT
ONLY MOISTURE OIL AND DIRT GET THIS FAR
OIL AND MOISTURE COME OUT HERE

Dexter AUTOMATIC AIR SEPARATORS are available for air line sizes ⅛" to 10", for point-of-use and main line all-welded construction; no cartridges or filters; 98% efficient.

Another Dexter Preventative Maintenance Product
Send for Full Descriptive Catalog

THE LEAVITT MACHINE CO.
ORANGE, MASSACHUSETTS

For more facts circle 609 on Reply Card

NEW PRODUCTS

(Begins on page 200)

nesium orthosphosphate phosphor converts ultra-violet radiation into more white light than formerly possible, it is explained. Higher lighting levels resulting from the increased light output are reported to reduce lighting costs up to 15 per cent in average industrial areas.

Two of the lamps are completely coated on the inside, except for tip and neck, and two have the phosphor coating on the base half only. Life of the lamps is listed as 6000 hr. They will be made of heat resistant glass and are designed for use in areas where higher than usual mounting is required. General Electric Co.

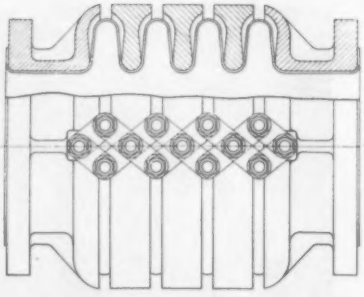
21—TRANSFER UNIT reverses flow in minimum space

This vertical transfer unit is designed to change direction of material flow on a conveying system. It does this without 180-deg curved conveyor sections, and can operate in limited space. Directional change is by means of a vertical lift which operates in a self-supported, automatic unit. Capacity ranges are from light to medium loads. A vertical transfer unit can be placed at the end of two conveyor lines located in a direct vertical plane, and spaced to allow clearance for materials handled. Cartons coming off the upper track of conveyor flow onto

a wheel conveyor section on the lift platform, tripping a starting switch. The platform automatically descends to the level of the lower track, and tilts to start the carton away from the transfer unit. As the carton leaves, it trips a limit switch, causing the lift to return to upper level. Succeeding cartons on the top track are held back by an automatic case stop. The transfer unit can be used with gravity or power-driven conveyor units, in descending or ascending flow lines. The Rapids-Standard Co., Inc.

22—EXPANSION JOINTS offer improved design

Duo Equalizing Joints are announced as expansion joints in which movement of power and process piping systems is shared equally by all corrugations. They are suggested for all-weather outdoor piping systems and indoor systems operating on frequent on-and-off cycles to protect piping and equipment against damage due to temperature changes. Equal distribution



of pipe expansion and contraction to all corrugations is accomplished by pantographs, as illustrated. Pantograph neutrals are anchored to the end fittings and intermediate equalizing rings. End fitting movement is immediately transferred by the pantograph to all equalizing rings, it is explained, moving all rings the same distance at the same time to prevent undue stress to any one corrugation.

Advantages claimed for the new expansion include: 40 per cent longer life than self equalizing expansion joints at same pressure and movement; 30 per cent less than overall length; 30 per cent less weight; and greater stability at high pressures. The units are stainless steel, available in sizes from 3- to 72-in. diam and for traverses to 7½ in. in a single, 15 in. in a double unit; they are designed for 150 and 300 psi working pressure. Company also makes this style unit in copper for use with copper or brass piping. Zallea Brothers.

23—DUST COLLECTOR needs minimum maintenance

The Mikro-Pulsaire Collector presents a simplified appearance, with a new method of continuous filter cleaning including the absence of moving parts. Units consist of varied numbers of cylindrical filter elements—4 or 6 ft long—enclosed in a dust-tight housing. Dust-laden air is admitted to the housing through a side inlet. Clean air is withdrawn from the inside of the filter elements with an air circulating system. A major portion of the dust material goes directly down to bottom discharge of the housing. The balance of dust material is re-

(Begins on page 200)

tained on the outside surfaces of the filter elements; as this dust builds up, flow resistance increases.

Periodic cleaning is done by introducing a jet of high pressure air through a venturi mounted above each filter cylinder. This primary high pressure air pumps additional secondary air via the jet pump process, producing a reverse flow sufficient to clean the dust material clinging to the outside surfaces of these cylinders. A single filter is cleared at a time; therefore continuous flow of dust through the collector is maintained. The jets are controlled by solenoid valves, actuated by an electric timer, adjustable, so the cleaning cycle can be varied to meet load conditions. According to company, no lubrication is required for the units, other than that concerned with assessory equipment.

These collector units require less space than many types of the same capacity, and are available in units with 9, 20, 30 and 48 filter tubes of 4- or 6-ft length. Pulverizing Machinery Div., Metals Disintegrating Co., Inc.

24—DRILL EXTRACTOR gets broken ones out quickly

This twist drill extractor provides a quick and sure withdrawal of broken twist drills from their holes. It is so designed that it is not necessary to disturb the jig or set-up, and normal hand pressure is all that is required when simple directions are followed. Standard set of five extractors, size 5/32 to 1 in., comes in a zippered plastic pouch and sells for about $15. Eagle Metal & Tool Corp.

Reader Service Cards on pages 275-276 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

25—POWDERED DETERGENT for general purpose use

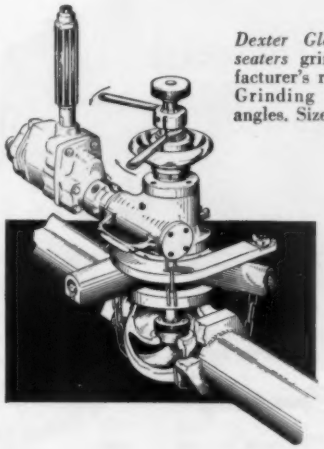
A-P-C is a concentrated, powdered detergent announced as 100 per cent active and containing no fillers. Buffered to maintain a maximum pH of 10.6, this cleaner is said to have excellent cleaning properties and not harm the hands, to have high sudsing and high suds-staying power, and be safe on commonly found surfaces, in-

GRIND new, precision VALVE SEATS in-the-line in a matter of minutes with POWER!

Section removed from valve reveals grinding head seated snugly against valve seat. Universal joint permits uniform grinding at any angle.

Reseating a six inch gate valve. Reseaters can be attached to overhead valves or valves in vertical position. Grinding heads for all sizes. Sizes 1" thru 12".

The new DEXTER In-The-Line Gate and Globe VALVE RESEATERS do not cut new seats, but *GRIND* them; a new seat can be applied to any modern valve *regardless of material hardness* in a fraction of the time required by any other method we know of. Rapid reseating of high quality, hard seated valves in-the-line saves you hours of lost production time, high labor rates and the cost of maintaining a large valve inventory. Valve reseating tools should be used at the earliest suspicion of a leak in a valve. We will be glad to have our representative call to show our 16mm movie or for complete information write to Leavitt Machine Co., Orange, Mass., Valve Reseater Division.



Dexter Globe Valve Reseaters grind from manufacturer's reference points. Grinding heads for all angles. Sizes ¼" thru 12".

Gate Reseater with complete set of grinding attachments is stored in compact, easy to carry metal box.

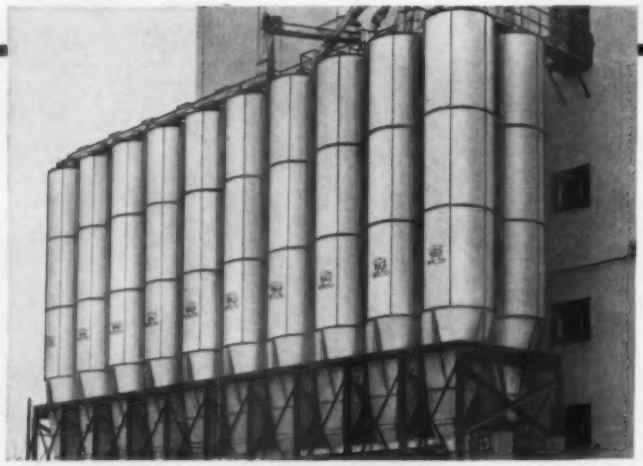
THE LEAVITT MACHINE COMPANY

ORANGE, MASSACHUSETTS

VALVE RESEATING TOOLS . . STEAM TRAPS . . AUTOMATIC AIR SEPARATORS

For more facts circle 610 on Reply Card

Cut Material Handling Costs with DAY BULK MATERIAL TANKS

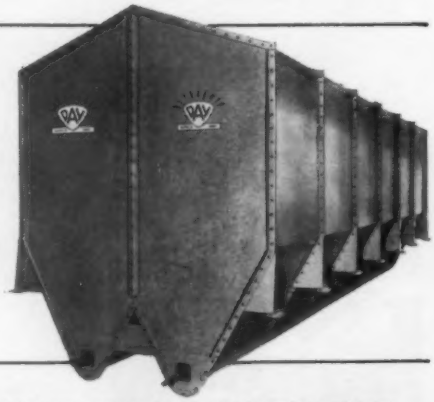


Each of these DAY vertical bulk material tanks has an approximate storage capacity of one carload. They serve as storage tanks for a packaging line as well as for truck and railcar loading. Every day more and more plants find large quantities of dry bulk materials can be handled more economically using DAY bulk material tanks. They save labor, containers and storage costs.

DAY bulk material tanks are made of black iron, galvanized or stainless steel. They are built and shipped in *easily erected, bolted sections*. Vertical tanks are furnished in sizes from 3 to 14 feet in diameter, up to 100 feet high. No support is required above the cone level. Patented, suspension discs are available for vertical type tanks to prevent bridging and assure free flow of product.

DAY Horizontal Bulk Material Tanks

Using DAY horizontal bulk material tanks, companies report savings of up to 25¢ per bag compared to handling bulk materials in bags. Ideal for buildings with limited headroom. Standard or special sizes available. Low installation cost.



For detailed information on bulk material storage tanks and pneumatic conveying equipment to suit your production and storage needs, write toDAY for Bulletins 529 and 549.

The **DAY** *Company*

Sold in United States by
The DAY SALES Company
907 Third Ave. N.E., Minneapolis 13, Minn.

Made and sold in Canada by
The DAY Company of Canada Ltd.
P.O. Box 70G, Fort William, Ontario

Representatives in Principal Cities

DAY BULK MATERIAL HANDLING SAVES MONEY

For more facts circle 611 on Reply Card

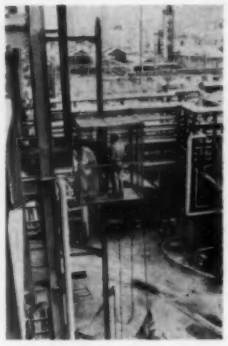
NEW PRODUCTS

(Begins on page 200)

cluding aluminum. It conforms to pertinent specifications for cleaning painted surfaces. A-P-C is used in concentration of ½ oz to 4 oz to a gallon of water, at temperatures of 70 to 140 F, and is soluble in hot or cold, hard, soft or saline water. It is suggested for cleaning floors, vehicles and equipment; as a steam cleaning composition; and in hand washing of food utensils. Bulletin P-7572 gives details. Kelite Corp.

26—ELEVATOR incorporates many safety features

According to manufacturer, safety features incorporated in this demountable passenger elevator in most cases surpass codes and ASA specifications. It is designed to replace permanent-type installations formerly required in many states for transporting personnel during construction, maintenace and repair work and other industrial applications. This elevator



operates on a vertical monorail and has a 2000-lb or eight-passenger capacity. It is claimed simple to set up and operate, and can be dis-assembled, moved, and re-erected. Its flexibility permits wide use in large plants as a semi-permanent personnel and materials handling unit which can be mounted outside a building.

The double-grooved pulley on top of the monorail carries the two independent steel hoisting cables as they lift the elevator car. A cable equalizer maintains equal tension on the two hoisting cables and trips a car safety locking device should either cable stretch abnormally or break. This serves to stop the elevator immediately on the monorail column and hold it there even while loaded. In the same operation, power is automatically shut off. Other safety features include limit switches that actuate if the car should go beyond its normal limit of travel. Automatic limit switches are provided to

For more facts circle 612 on Reply Card ——→

Davis Fire Brick Company, Jackson, Ohio

Free Light

How HETRON®-based panels let nature subsidize your lighting costs

Install these polyester panels in skylights and windows and you can flood work areas with free light.

Efficiency experts have proved that this is the sort of cool, soft light that increases worker efficiency.

Non-glaring, shadowless light makes for safer working conditions, too.

Safer should fire occur • HETRON-based panels will *not* contribute to a fire. HETRON is inherently self-extinguishing—will burn only when in direct contact with a hot flame—snuffs out as soon as the flame source is removed. HETRON-based panels are shatterproof, too.

You can get HETRON-based polyester panels with both Underwriters' listing and Factory Mutual approval. For the names of reputable fabricators, write us today.

Safe for any plant that recognizes Underwriters' listing and Factory Mutual approval. HETRON-based panels are fire-retardant, shatterproof. Available in corrugated and flat sheets which are easy to install and require little maintenance.

DUREZ®

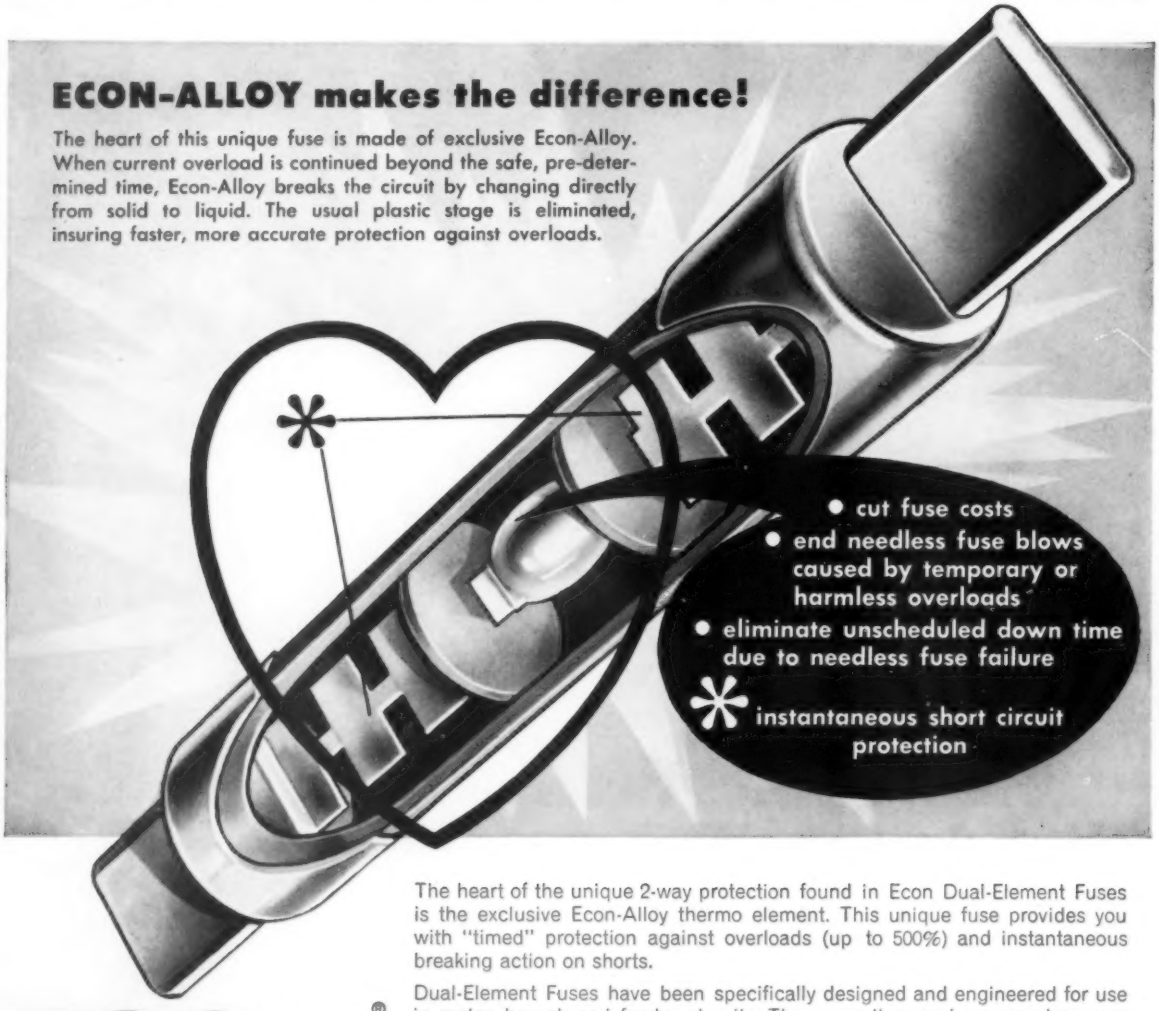
DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

3910 Walck Road, North Tonawanda, N. Y.

HOOKER CHEMICALS PLASTICS

The only Fuse with the **HEART** TO GIVE COMPLETE PROTECTION


ECON-ALLOY makes the difference!
The heart of this unique fuse is made of exclusive Econ-Alloy. When current overload is continued beyond the safe, pre-determined time, Econ-Alloy breaks the circuit by changing directly from solid to liquid. The usual plastic stage is eliminated, insuring faster, more accurate protection against overloads.
ECON
• cut fuse costs
• end needless fuse blows caused by temporary or harmless overloads
• eliminate unscheduled down time due to needless fuse failure
* instantaneous short circuit protection

The heart of the unique 2-way protection found in Econ Dual-Element Fuses is the exclusive Econ-Alloy thermo element. This unique fuse provides you with "timed" protection against overloads (up to 500%) and instantaneous breaking action on shorts.

Dual-Element Fuses have been specifically designed and engineered for use in motor, branch and feeder circuits. They save time and money where you have frequent power surges such as on high starting torque motors . . . often by-pass the need for expensive circuit breaker equipment.

Dual-Element Fuses are available in sizes from 2" up to 13⅞"; 0 to 600 amps; for 250 and 600 volts; in both knife blade and ferrule types. Underwriters' Laboratories listed.

Write for ECON Dual-Element Catalog S-60 . . . or literature on all Economy Fuses.

ECON®
DUAL-ELEMENT cartridge fuses

SINCE 1911

ECONOMY FUSES FOR EVERY PURPOSE

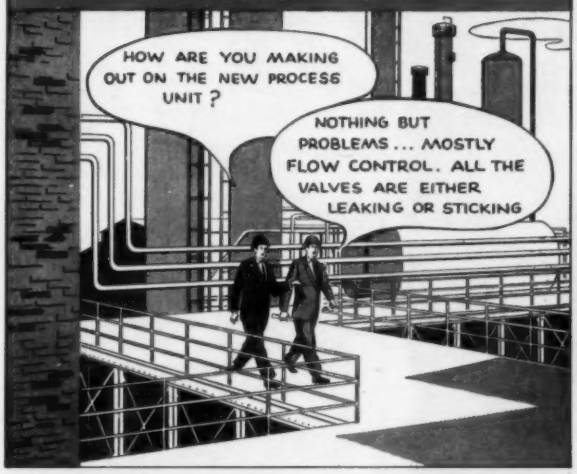
1562

ask your ELECTRICAL WHOLESALER for Economy Fuses

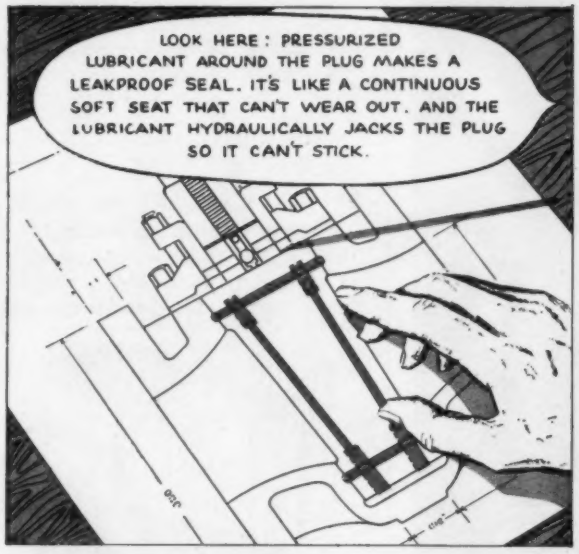
ECONOMY FUSE & MFG. CO., 2717 Greenview Avenue, Chicago 14, Illinois
For more facts circle 613 on Reply Card

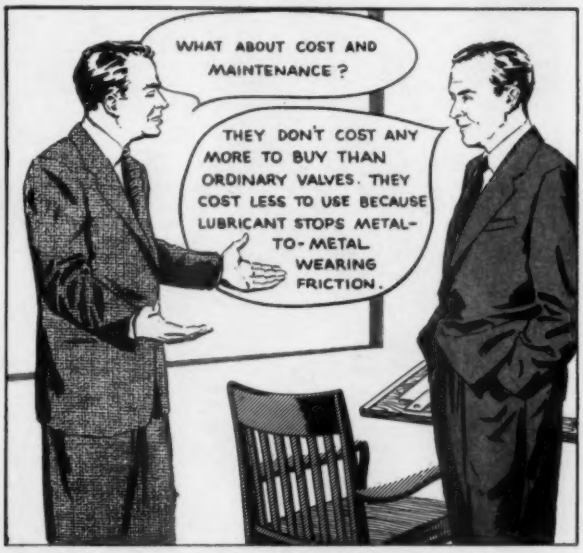
COST CUTTING IN ACTION

by Rockwell-Nordstrom


HOW ARE YOU MAKING OUT ON THE NEW PROCESS UNIT ?
NOTHING BUT PROBLEMS ... MOSTLY FLOW CONTROL. ALL THE VALVES ARE EITHER LEAKING OR STICKING

WE'VE SWITCHED TO ROCKWELL-NORDSTROM LUBRICATED PLUG VALVES ON UNITS 3 AND 4. WHY DON'T YOU TRY THEM? THEY'VE REALLY HELPED OUR FLOW CONTROL.
WHAT MAKES THEM SO SPECIAL ?


LOOK HERE : PRESSURIZED LUBRICANT AROUND THE PLUG MAKES A LEAKPROOF SEAL. IT'S LIKE A CONTINUOUS SOFT SEAT THAT CAN'T WEAR OUT. AND THE LUBRICANT HYDRAULICALLY JACKS THE PLUG SO IT CAN'T STICK.


WHAT ABOUT COST AND MAINTENANCE ?
THEY DON'T COST ANY MORE TO BUY THAN ORDINARY VALVES. THEY COST LESS TO USE BECAUSE LUBRICANT STOPS METAL-TO-METAL WEARING FRICTION.

WELL, IF THEY'RE SO GOOD, WHY DON'T WE USE ROCKWELL-NORDSTROM VALVES IN MORE PLACES ?
WE PROBABLY WILL. I'VE HAD THEM ON TEST FOR A GOOD WHILE AND THE OPERATIONS AND COST REPORTS HAVE ME CONVINCED.

ROCKWELL-
Nordstrom
VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Rockwell-Nordstrom valves are available in a complete range of sizes and ratings in semi-steel, steel, stainless steel and other corrosion resisting metals.

Send Coupon For Free Literature

Rockwell Manufacturing Company
Rockwell-Nordstrom Valve Division
Department CS-1, Pittsburgh 8, Pa.

☐ Please send me complete information on Rockwell-Nordstrom valves for process, industrial and manufacturing flow control.

☐ Please send me the name of your nearest distributor . . . ask him (to) (not to) call immediately.

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Firm_____

Street_____

City_____ Zone_____ State_____

For more facts circle 614 on Reply Card

only circuit breakers
protect continuity
in automation

fewer power stoppages...
faster restarts...
guard production levels

circuit breaker protection is sure and accurate

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 615 on Reply Card

NEW PRODUCTS

(Begins on page 200)

prevent movement of elevator unless both gates are closed and latched. Hawkeye Engineering Co., Inc.

27—MECHANICAL SEALS with interchangeable parts

Included in the Chempro Wedge-Lock line of mechanical seals are both external and internal types with interchangeable parts for any given shaft size. With the exception of the stator bushing, identical in size and shape, but of different materials, the line of seals is completely interchangeable in parts. Advantages cited are savings effected through reduction in spare parts stock and increased protection against pump downtime. These seals are designed for economical service on pumps handling acids, caustics and other liquids and slurries from -80 to 500 F, from vacuum to 100 psi. Seal faces are within the stuffing box. Chemical & Power Products, Inc.

28—SERVICE CART for stockroom, shipping room

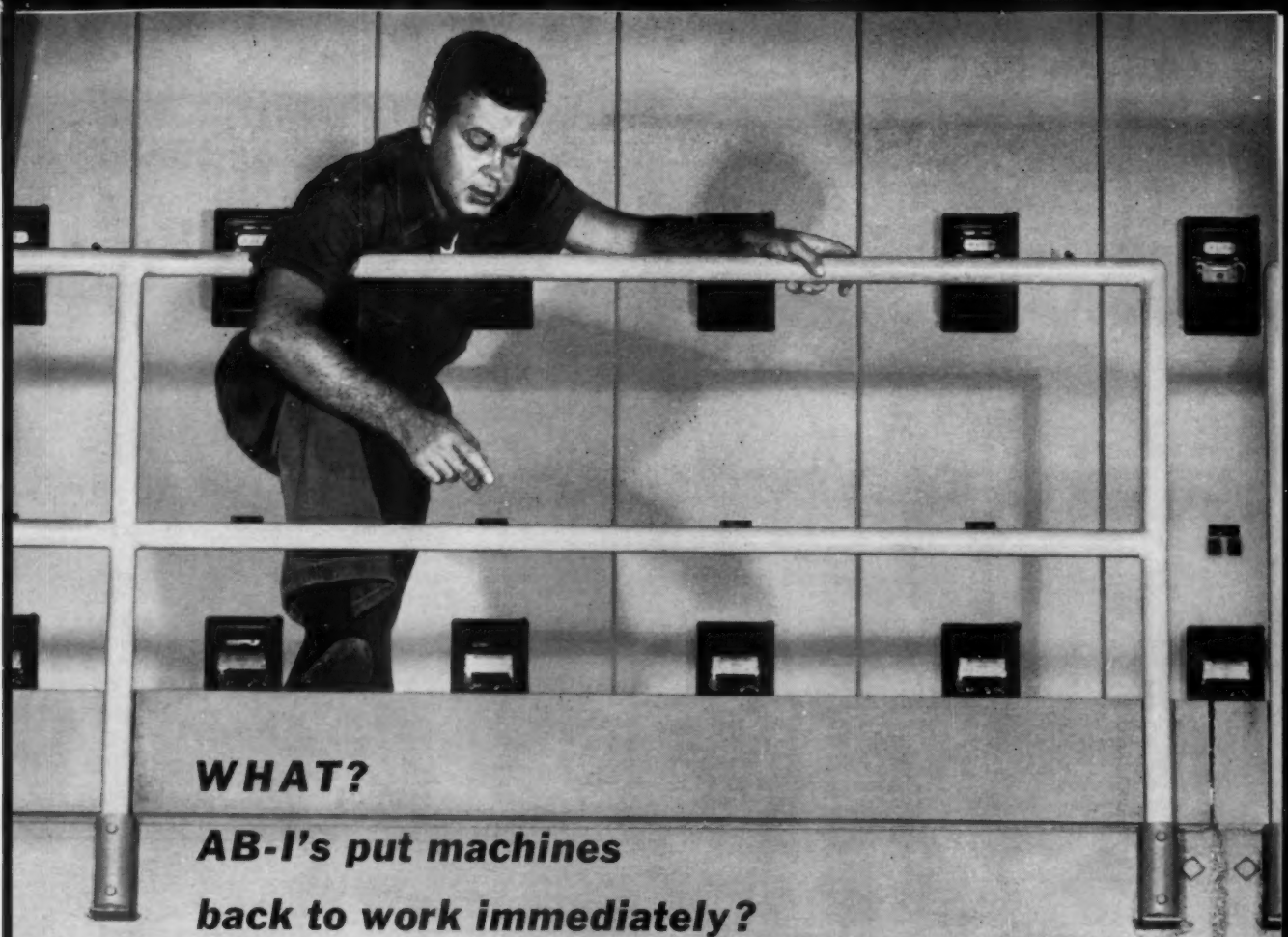
This improved, larger service cart, 36 in. long by 24 in. wide by 32 in. high, is suggested as a stockroom cart,

in shipping and receiving rooms, and as an assembly line feeder. Casters are 5 in. in diameter for easy rolling. Front casters are set back from the leading edge of the lower tray to protect them. Pan-type trays are 3 in. deep. Lyon Metal Products Inc.

29—ENGINEER'S TAPE has two scales on its blade

Offering greater convenience for those who work with both eighths and and tenths measurements, this tape combines both scales on one side of the blade, enabling instant conversions from eighths to tenths. Of white enameled steel with black num-

For more facts circle 616 on Reply Card →



WHAT?

AB-I's put machines back to work immediately?

LIKE LIGHTNING. And in many cases Westinghouse AB-I circuit breakers cost less than safety switches.

With no fuses to replace, no waiting for authorized personnel to correct the fault, anyone can restore service. A flip of the handle does it. If the fault lingers, the exclusive De-ion® arc quencher goes into action again.

Can you afford the lost production, the lost profit caused by down time, even temporary down time caused by harmless overloads? When fuses blow, temporary faults take just as long to correct as serious ones.

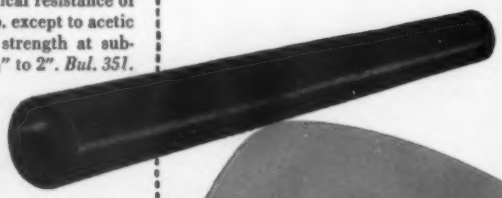
AB-I circuit breakers are the modern successor to the fused switch. No other protective device can match Westinghouse AB-I's for performance, quality and economy. For further information ask your Westinghouse distributor for Descriptive Bulletin 30-250 or write Westinghouse, P. O. Box 868, Pittsburgh 30, Pa. J-30226

YOU CAN BE SURE... IF IT'S

Westinghouse

STAYS TOUGH
AT SUB-ZERO TEMPERATURES

ACE PARIAN . . . odorless, tasteless, rigid polyethylene. Best chemical resistance of any plastic at room temp. except to acetic acid. Excellent impact strength at sub-zero temp. Rigid pipe ½" to 2". *Bul. 351.*

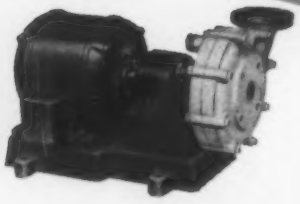


LIFE-TIME
ACID STORAGE TANKS
Rubber-lined by ACE
2-layer system

Economical, universal protection against all alkalis, metallic salts, practically all inorganic acids, hydrochloric acid any strength, sulphuric to 50%, nitric to 20%, phosphoric to 75%. Good to 160 deg. F. . . . sometimes higher. Soft rubber interlayer aids shock resistance.

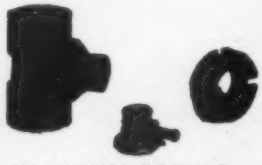
Now eleven ACE Materials to STOP CORROSION

Eleven job-proved rubber and plastic materials now available in ACE piping, valves, pumps and tanks. Tough Ace-lite rubber-plastic blend . . . Saran . . . heat-resistant Tempron . . . Riviclor PVC . . . many others. Write for comparative properties Bulletin CE-50 . . . or call your American Hard Rubber Company distributor.



ACE "WAM" . . . THE FINEST
Non-metallic Acid Pump

On job after job, this 80-gpm. centrifugal pump has earned highest praise. Hard rubber casing and impeller, Hastelloy C shaft. Handles nearly all corrosives. Mechanically simple, trouble-free. *Bulletin CE-55.* Larger ACE pumps available.



NEED SPECIAL FITTINGS,
COVERS, TANKS, PARTS?

If you want life-time corrosion protection for special parts needed in quantity . . . we may save for you by molding them of ACE hard rubber or plastics to your most exacting requirements. Our facilities among world's largest. Ask for recommendations.

ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
Ace Avenue • Butler, New Jersey
DIVISION OF AMERACE CORPORATION

For more facts circle 617 on Reply Card

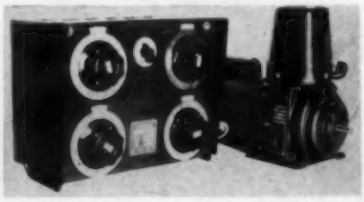
NEW PRODUCTS

(Begins on page 200)

bers, the blade is divided in half by a double line, with the regular inch and eighth graduations on one edge; the tenths and hundredths on the other. The tape comes in both 50-and 100-ft length. The price for the former is less than $7.00. The longer length tape sells for approximately $9.00. Evans Rule Co.

30—SEQUENCE CONTROL handles programming jobs

The Sequentrol is designed to establish a number of functions that must take place in a predetermined order to preset values. Among its uses are machine tool and welding positioner programming, work station control for assembling machines and dipping machine programming. A vernier dial

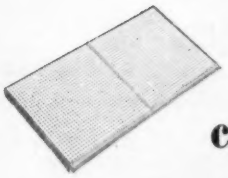


or revolution counter type control is set on the panel for each position or rate to be established. In programmed sequence, each dial or counter assumes command of the setting of a Shaftrol (a shaft-mounted gear motor) operator. This establishes position of a tool, setting of a variable speed drive, or valve, etc. Machines now operated manually can be converted to automatic sequencing through use of the Sequentrol-Shaftrol combination.

The Sequentrol includes built-in "anticipation" and "accuracy" adjustments that signal the Shaftrol to slow down as the desired setting is approached. The Sequentrol is designed to handle operators from sub-fractional to 10 hp. Commands may originate from controls at the panel, as shown, or from remotely located potentiometers or punch card reading devices. The Sequentrol may be used to control a number of machines in sequence, or to provide a program control of several steps for one machine. Information is in Bulletin J-100. The Jordan Co., Inc.

31—FORCED DRAFT BURNER for all fuel gases

Known as the RGF-F Series, this industrial forced draft, flange mounted gas burner is reported lower in cost than conventional forced draft burners



Case history shows how Gold Bond Acoustimetal can make your plant more efficient 3 ways

Increased production . . . reduced employee fatigue . . . lower maintenance costs—these are the three ways in which Gold Bond Acoustimetal adds to the efficiency of this new C. P. Clare & Co. plant in Chicago.

The company makes electrical relays—the intricate assembly process is shown above. Noise interferes with accurate work like this—Acoustimetal's incombustible mineral wool pads absorb from 80% to 90% of all noises that strike it. Such precision manufacturing demands bright lighting without the glare that causes eye-strain—Acoustimetal's baked white enamel surface provides light reflectance in the .70-.73 range.

This entire award-winning plant is designed for easy maintenance—Acoustimetal panels wipe clean with a soapy sponge. Should the company change color schemes, Acoustimetal can be repainted without loss of acoustical efficiency.

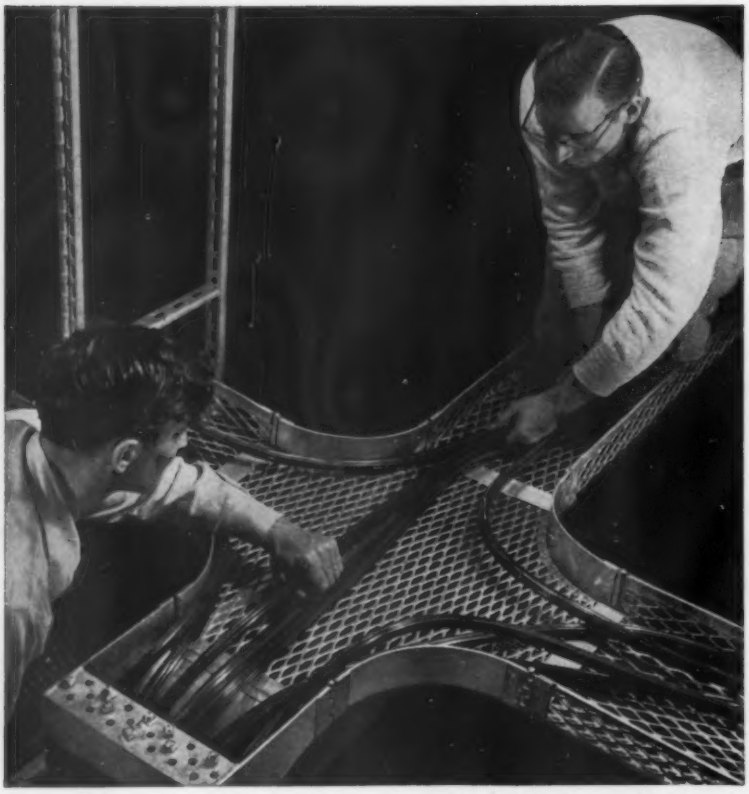
There is a Gold Bond Acoustical Ceiling designed for every ceiling in your plant, office or work area. For further information on how Gold Bond® can help *your* factory increase production . . . reduce employee fatigue . . . and lower maintenance costs . . . write to Dept. PE-107, National Gypsum Company, Buffalo 2, N.Y.

ACOUSTICAL CEILINGS

NATIONAL GYPSUM COMPANY

Gold Bond
BUILDING PRODUCTS

For more facts circle 618 on Reply Card



Here's a cable supporting system with space reserved for future needs

COPE CABLE TROUGH GIVES YOUR SYSTEM ROOM FOR GROWTH!

Cope cable trough design gives you greater load carrying capacity per dollar *now—plus built-in system expansibility* that will minimize the cost of future system expansion. A *single* 24" wide section of Cope cable trough supports as many cables as 16 lengths of 4" conduit. Additional cables can be quickly and easily laid in *existing* trough as new equipment installations require. The lower *first* cost of a Cope cable trough installation *saves you money a second time* when you need to increase or expand your power distribution system!

Reduced System Maintenance Costs. Easy-to-get-at Cope cable trough also eliminates costly maintenance problems down the line. Once cable is laid in Cope expanded metal trough, it's readily accessible for easy inspection, repair . . . or *re-routing* when system changes are required. And greater installation flexibility of lightweight Cope cable trough and a complete line of system accessories and fittings reduce design time up to 25% for laying out the most complicated system . . . assure easy system maintenance even in the most cramped quarters.

Cut Costs Three Ways. You save *three ways* when you specify Cope cable supporting systems with pin-type coupler . . . trough, ladder or channel.

- **LOWER FIRST COST**
- **LOWER INSTALLATION COSTS**
- **LOWER SYSTEM MAINTENANCE COSTS**

Discuss these advantages for *your* installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1008

T. J. COPE *Division*

ROME CABLE CORPORATION

For more facts circle 619 on Reply Card

NEW PRODUCTS

(Begins on page 200)

and easier to install. It is for use with Scotch marine or other types of high or low pressure boilers and can be attached by bolting burner assembly to boiler front. Burner is designed to fire all types of fuel gas with high combustion efficiency and a wide turn down ratio. All essential elements of burner mechanism, including controls and forced draft air supply, are factory assembled and tested. An enclosed electronic control panel is mounted on the unit. Iron Fireman Mfg. Co.

32—QUICK ANTIFOAMS in flake and powder forms

The HC-300 series of "instant" antifoams for food, chemical and industrial processing situations, come in flake or powder form. You simply add them to water and they emulsify immediately, says manufacturer, a concentration of ½ to 1 per cent being average. The resulting emulsion is said to remain stable for long periods of time. Long run economy is reported for these antifoams in concentrated form —a 25 lb bag can make the equivalent of ten 55-gal drums of most liquid antifoams. Hodag Chemical Corp.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

33—MASONRY COATINGS are "one-coat" compounds

Only one coat is required for each of three masonry coating compounds, it is announced. Sika-Kote is a cementitious powder mixed with water, for protecting interior and exterior masonry walls above and below grade against water penetration. Described as non-dusting and non-flaking, Sika-Kote is brushed on, a gallon covering 60 sq ft or more, depending on surface porosity. It comes in 12 colors and white.

Sika Gard is a liquid floor hardener for impregnating concrete surfaces to form a hard chemical compound that binds loose concrete particles, preventing dusting, increasing wear resistance and reducing stains from oils and greases. Sika-Gard is spread over concrete floors with a long handled broom or squeegee. A gallon covers 250-350 sq ft. Floors may be walked on or trucked over within 24

WESTINGHOUSE MAKES SURE INSIDE AND OUT...

Another Gold Bond
ASBESTONE APPLICATION
built to last 100 years
...or more!

...with Gold Bond Corrugated ASBESTONE "400"

This modern Westinghouse plant in Vicksburg, Miss., used Corrugated ASBESTONE "400" for curtain walls outside *and* for noise baffles and heat diffusers inside, to make *sure* of:

1. ***Saving* on material costs.**
2. ***Saving* on construction costs.**
3. ***Saving* on maintenance costs.**

The curtain walls at Westinghouse help keep the inside cool on hot days... the baffle-walls minimize reverberations and cut down hot air movement within the large manufacturing and processing area. And these installations will last because Corrugated ASBESTONE "400" permanently resists fire, adverse weather conditions, corrosion and rot.

You can make sure too, when you specify rugged, low cost Corrugated ASBESTONE "400" for your clients. For further details write Dept. PE107, National Gypsum Company, Buffalo 2, N. Y.

CORRUGATED ASBESTONE "400"

NATIONAL GYPSUM COMPANY

Gold Bond
BUILDING PRODUCTS

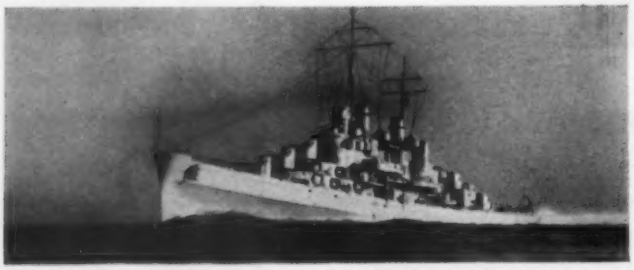
For more facts circle 620 on Reply Card

CORROSION
NO PROBLEM IN NEW NAVY
WASHDOWN SYSTEM

OVER 75
MILES OF
PROTECTION

with Boltaron
Unplasticized PVC

Washdown systems have been developed by the Navy to protect ships from the contamination of radioactive fallout during and after nuclear bomb blasts. The system provides a protective, cleansing spray of salt water that drenches all weather surfaces, washing radioactive particles overboard. Ships and men can continue in action. Boltaron Unplasticized PVC met not only the Navy's rigid specifications and exacting performance requirements, but also price competition and was chosen over all other materials for these important washdown systems. This Navy contract is the *largest single order of rigid PVC ever placed in this country.*



BOLTARON CAN MEET YOUR NEEDS FOR PIPE, FITTINGS, VALVES, CUSTOM APPLICATIONS!

- It resists corrosive gases, liquids, treated or untreated water, alcohol, alkalies, acids, etc.
- It is non-conductive, eliminates electrolysis problems.
- It is abrasion-resistant, gives long service.
- It needs virtually no maintenance.
- It is versatile, easy to handle.
- It is lightweight . . . ½ the weight of aluminum.

TECHNICAL SERVICE:
— skilled engineers are on call to give you expert advice or service without obligation. Feel free to call on them at any time.

TRAINING SCHOOL: The Plastic Fabricating Institute, Lawrence, Massachusetts sponsored by H. N. Hartwell and Bolta Products, was organized to instruct fabricators, distributors, piping contractors, etc., in the fabrication and application of Boltaron unplasticized PVC.

Contact your local distributor or write:

H. N. HARTWELL & SON, INC.
Industrial Plastics Division, Park Square Bldg., Box 310, Boston 16, Massachusetts
The only integrated source for Unplasticized PVC Materials

For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 200)

hr after application, it is noted. Deck paints may be applied over the Sika-Gard base, if desired. Sika-Pel, a transparent water repellent impregnation for all masonry surfaces, is claimed to shed rain water and reduce efflorescence without discoloring surfaces. Sika-Pel may be applied with brush or coarse nozzle, low pressure spray. A gallon covers about 180 sq ft. Sika Chemical Corp.

34—AUTOMATIC PARTITIONS need less storage space

Coil-Wal Automatic Partition coils in its own storage box, requires no heavy overhead trusses or beams, and permits flush ceiling design. Design incorporates, straight-line travel and smooth, quiet electrical-mechanical action readily adaptable for offices and

other areas where large movable partitions are required. Partitions are narrow wooden slats, joined by lightweight, pre-stressed steel cables to maintain a close-knit vertical position. According to company, narrow slat construction prevents reverberations, reduces sound, and provides excellent accoustical qualities in locations where noise levels on either side are near equal. Partitions require no special storage cubicles, yet can be recessed for flush wall construction. In addition, coil box design and straight-line travel permit mounting overhead track along side supporting beam, truss span, or truss to utilize full clearance under supports. Custom-made to any size and structural requirements, partitions are available in pull-push and pull-crank types for smaller installations and automatic-electric actuation for larger openings. Dubuque Products, Inc.

35—NON-CLOG PUMPS in horizontal, vertical types

This series of pumps incorporates company's Mono-Vane single-passage impellers, described as unique in that they may be trimmed to various di-

SKIL portable tools SAVE 50% production costs at Guerin-Zimmerman Co.

Paul Guerin, owner of this metal fabricating company, purchased SKIL Drivers and SKIL Disc Sanders for the assembly of sheet metal parts in his Cleveland shop. The immediate result of this change—production increased 50% at the same costs.

All the metal fabrication requires intensive sanding with disc sanders. The SKIL tools stay on the job longer under continuous use and are much easier to handle, report the men in the shop. Plus little downtime for maintenance. It means a 50% saving in production costs.

The experience of this company adds up to big savings—savings in time, money and labor. You, too, can SAVE with SKIL tools. Ask a SKIL distributor to show you the features of SKIL metalworking tools that can mean savings on your jobs. Or for a FREE catalogue on power tools write SKIL Corp. direct: Dept. PCT107, 5033 Elston Avenue, Chicago 30, Illinois.

SKIL

Made only by SKIL Corporation, manufacturer of famous SKIL and SKILSAW products, 5033 Elston Avenue, Chicago 30, Ill. In Canada: 3601 Dundas St. West, Toronto 9, Ont.

On metalworking operations, you SAVE with SKIL tools

For more facts circle 622 on Reply Card

HERE...

where proper maintenance
can mean
LIFE or DEATH...

SPENCER

PORTABLE VACUUM CLEANERS

In building jet planes, thorough maintenance procedures are more than just good housekeeping. They're *absolutely vital* to protect pilot and plane from possible disaster.

If not removed, a stray nut, bolt or rivet can work its way into the air intake duct . . . be sucked into the engine . . . damage the turbine blades and cause the plane to flame-out in flight.

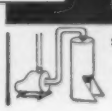
That's why, here at Republic Aviation, fuselages and wing sections of F-84 Thunderstreaks are SPENCER *vacuum-cleaned* to remove all stray metal.

Whether or not maintenance is a matter of life and death with you, it will pay to check on rugged, reliable SPENCER vacuum cleaners.

REQUEST CATALOG NO. 155B

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

OTHER QUALITY SPENCER PRODUCTS



STATIONARY VACUUM SYSTEMS

PORTABLE VACUUM CLEANERS

PNEUMATIC CONVEYING SYSTEMS

For more facts circle 623 on Reply Card

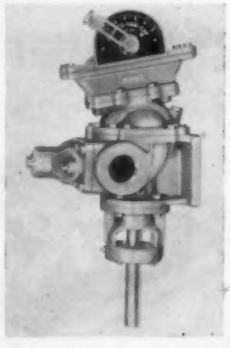
NEW PRODUCTS

(Begins on page 200)

ameters (at factory or at user's own plant) to meet requirements of other heads and capacities. This is because of dynamic and hydraulic impeller balance retained without need for separate counterbalance, it is explained. Sizes range from 3 to 5 in., inclusive, suction and discharge diameters. Suggested applications include elevating sewage, pumping sludge, handling of heavy settleable solids, effluent and other wastes, and particularly, handling long, stringy solids. Discharge may be turned to various positions. Detachable suction and packing covers provide access to impeller area. Details are in Bulletin 121-MV. Aurora Pump Div., The New York Air Brake Co.

36—METERING PUMP changes capacity to suit product

The Vari-Cap Pump derives its name from the fact that its capacity can be changed to suit the product being pumped by a simple dial setting. No



slide rule calculations or gear changers are necessary. All that is required is a setting by dial to maintain output capacity desired The metering pump can be used for blending and processing operations, such as fuel oils, caustics, additives and various other chemical products. Pump speed can be adjusted to handle products of varying viscosities. Operation can be powered from standard capacity motors and the differential taken up in pump's adjustment from zero to 40 gpm, at 500 rpm. Granberg Corp.

37—STOP CLOCK with an instantaneous reset

The Type 691 Time Totalizer is an electrical stop clock featuring instantaneous reset (reported 1/10 sec) and accuracy within 0.01 sec. A dust-tight commercial model and a hermetically

LOW-COST CRANES

...for intermittent or stand-by service

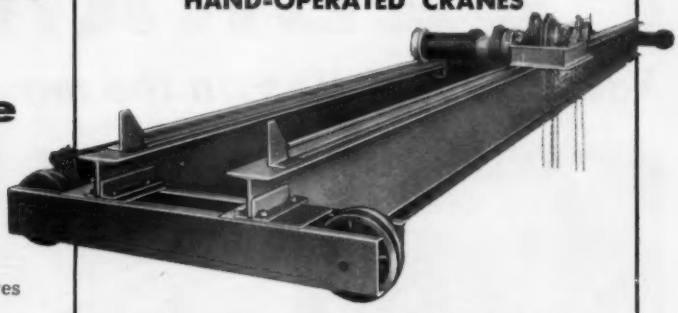
These rugged 'Load Lifter' Cranes are standardized and production built for average industrial use. Many of the machinery units are common to several types. This fact plus our capacity to build these cranes in quantity saves you money.

The finest workmanship, materials and structural and operational features give these 'Load Lifter' Cranes top rating in trouble-free performance, long service life and low maintenance. Maximum use of anti-friction bearings assures smooth and easy travel. Rigid construction prevents binding on the tracks.

Whatever your requirements for intermittent or stand-by crane service, there is a 'Load Lifter' Crane for hand or electric operation to meet your needs, economically. Every type and capacity provides the utmost in safety for man, load and crane. Those that require a lifting unit can easily be equipped with one of our hand or electrically-operated hoists and accessories.

If you want low-cost crane service for occasional lifting and moving, get all the details about these efficient, reliable units. *Ask your "Shaw-Box" Distributor to help you select—or write for Catalog 218C.*

HAND-OPERATED CRANES

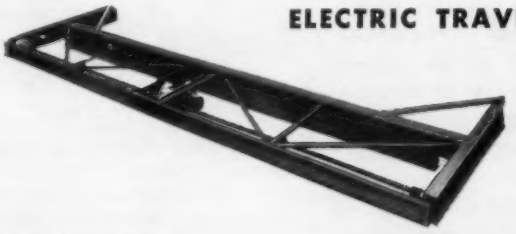


TYPE "BR". 3 to 50 tons. Extensively used in power plants, pumping stations, stone crushing plants, and warehouses. Two lifting speeds. Lifts: 28 to 37½ feet. Double girder construction. Spans: to 60 feet. Geared to convert every possible ounce of muscle effort into useful work. Has fast-acting load brake. Grooved drum takes full run of the wire rope without overlapping. No tail chains to hang down and foul the load.

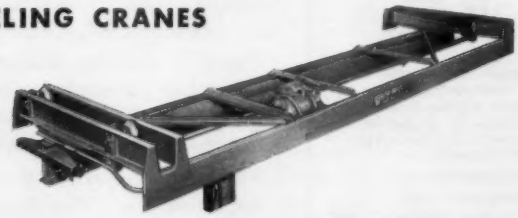
TYPE "H-SUH". ½ to 5 tons.
Suspends from I-beam overhead. For service wherever travel is short and speed is not essential. Single girder. Spans: to 31 feet. Easily equipped with hand or electric hoist of proper capacity and lift.

TYPE "SBR". ½ to 10 tons.
Particularly useful for accurate "spotting" and where travel length is moderate. Single girder. Spans: to 40 feet. Easily equipped with hand or electric hoist of proper capacity and lift.

ELECTRIC TRAVELING CRANES



TYPE "SBE". 1 to 5 tons.
Widely used in foundries, in side bays in machine shops, paper mills and other plants of moderate size. Pendant push-button control. Three Speeds. Top Traveling Speed: 150FPM with full load. Single girder with auxiliary truss. Spans: to 40 feet. Easily equipped with electric hoist of proper capacity and lift.



TYPE E-SUH. 1 to 5 tons.
Suspends from I-beams overhead. Popular in paper mills, warehouses, structural plants and shops to serve a main bay or local area. Pendant push-button control. Three speeds. Top Traveling Speed: 150FPM with full load. Single girder with auxiliary truss. Spans: to 40 feet. Easily equipped with electric hoist of proper capacity and lift.

57H-2

MAXWELL MANNING MOORE INC. M&M TRADE MARK

'Load Lifter'® CRANES

MANNING, MAXWELL & MOORE, INC.
SHAW-BOX CRANE & HOIST DIVISION
362 West Broadway • Muskegon, Michigan

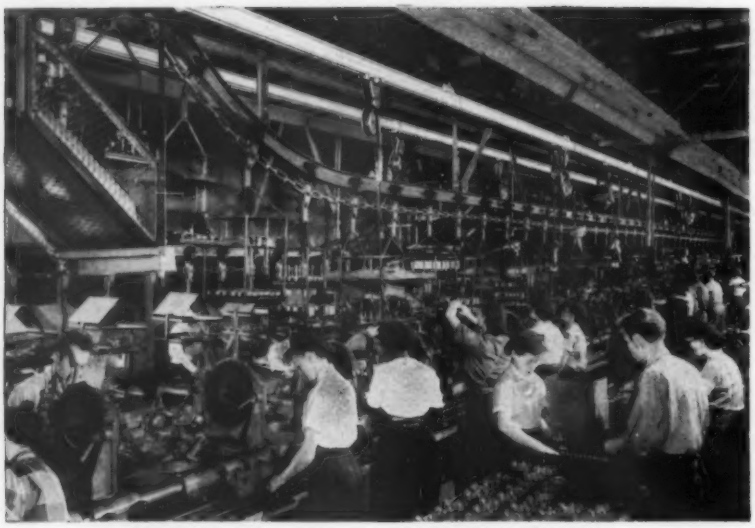
Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

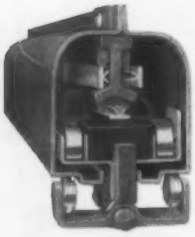
For more facts circle 624 on Reply Card

FEEDRAIL®

keeps production on the move



...because it moves with production



Feedrail systems (60 to 500 amperes) keep production moving throughout industry – provide convenient movable power sources for:

- Cranes and Hoists
- Production Lines
- Conveyor Assembly Lines
- Moving Test Lines
- Portable Tools
- Machine Tools
- Cutting and Sewing Rooms
- Lighting
- Motor Control
- Business Machines

Eliminate the dangerous, time-wasting "cable clutter" of old-fashioned production lines – and you've gone a long way to speeding up production.

Feedrail "moving power systems" do this by feeding power to portable tools and other electrical equipment through *overhead mobile outlets.*

Power is available instantly anywhere along the line. Long, dragging cables that hamper production are eliminated. Employees can move about in complete safety.

Result: *faster, safer production.*

An added plus is that Feedrail never becomes obsolete. If production requirements change, Feedrail can be relocated or extended with surprising ease and speed.

Find out what a difference Feedrail can make in your plant production. Get all the details. Write today to Dept. P-10.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

P72

ELECTRIC FEEDRAIL

Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET • NEW YORK 7, N. Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 200)

sealed military version are offered. Totalizer is available for either local or remote reset. Where local reset is desired, a pushbutton is provided on bezel. On the sealed timer, pushbutton actuates reset solenoid through a bellows. Load switches rated 5 amp to 250 v a-c resistive, operated from cams on either high or low speed pointer shafts, can be supplied. Number of pulses per second or minute and duration of pulses are factory set. With switches on both high and low speed pointer shafts (wired in series), it is possible to use Type 691 as a time delay or interval timer. Available ranges are 60 sec in 1/100 sec, 60 min in 1/100 min, and 60 min in seconds. Cramer Controls Corp.

38—DIRECT-DRIVEN FANS use four-blade propellers

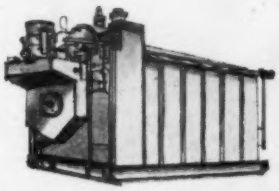
LS Type Direct-Driven Fans, designed to give better performance in low static pressure ranges, employ four-blade Macheta Airfoil propellers. They are available in ring, square

panel and duct types, in sizes from 24-to 48-in. diam. Ring and panel types are designed with curved orifice rings, to provide a uniform flow of air to propeller blades. Panel type is easily installed, company says, in any square opening with four corner-bolts. Duct type is used in standard-application duct sections, with entire unit inside of air stream. The heavy-duty all-welded units may be had with special-duty motors, alloy propellers and protective coatings for unusual or extreme moisture, temperature or corrosive conditions. Aerovent Fan Co.

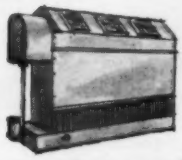
39—CONTROL DEVICE lets machine run unattended

Machines can operate unattended when supervised by TorqueTrol, an automation device. In addition to controlling tool feed, TorqueTrol is de-

Now. **new acid cleaners**



Steam Boilers, Condensers, Heat Exchangers, Piping



Air Conditioning Cooling Towers, Ice-Making Machines, Evaporating Condensers

Food-Processing Vessels, Pipelines, Gelatin Evaporators

Marine Salt-Water Evaporators and Heat Exchangers

in **dry** easy-to-handle form

Cleaners based on Du Pont Sulfamic Acid are safer, more convenient, non-fuming . . . dissolve in water to form effective, low-corrosive solutions

Now . . . acid cleaners you handle *dry!* No fumes or hazardous liquid spillage to worry about. When mixed with water, these cleaners have all the penetrating power of hydrochloric acid with far less corrosive effect. The key to these unusual properties is a remarkable new ingredient — Du Pont Sulfamic Acid.

Sulfamic acid-based cleaners remove scale and deposits from air conditioning and ice-making equipment; food-processing vessels; steam boilers; milk evaporators and pasteurizers; marine evaporators and heat exchangers. Cleaning action is fast, thorough. Downtime is eliminated in many cases because cleaners are added while equipment is in operation.

We'll gladly send you additional information on sulfamic acid-based cleaners and the names of formulators who offer these new compounds. Just mail the coupon below.

DU PONT
SULFAMIC ACID

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Room N-2533
Wilmington 98, Delaware

Please send me ☐ sulfamic acid general equipment cleaning bulletin; ☐ names of formulators offering cleaners based on sulfamic acid.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 626 on Reply Card

VERSATILE

Fir plywood, used as floor sections, helped Boeing Aircraft Company solve a scaffolding problem on their KC-135 jet tanker-transport tooling program. Standard plywood sizes are used; floor sections are designed to these dimensions and fabricated with rapid-assembly rail fittings. The standard size sections mean that scaffolding can be taken down and reassembled in whatever shape required by subsequent plane construction. Previously, each tooling required entirely new scaffold design.

DURABLE

Fir plywood is an ideal material for all types of tanks. The durability of overlaid Exterior-type fir plywood (made with 100% waterproof glue) is dramatically demonstrated by this use aboard a fishing boat. The salt-brine well holds 25,000 pounds of fish, was built to replace a metal refrigerated ice pack—at a saving of about 75%, including the cost of the compressor to keep the brine at 30°. Another advantage: no electrolysis problem, because of the wood construction.

LOW COST

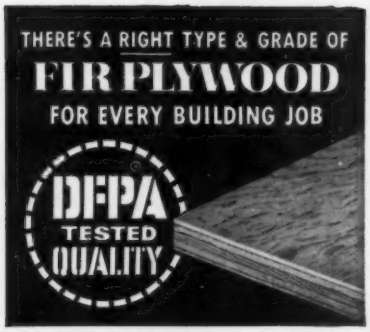
A 20% saving in material plus additional 40% reduction in time and labor costs was realized by Lyon Van & Storage Company's Export Division, Burbank, California, in the construction of fir plywood shipping containers. Shown are guided missile component crates, made with Exterior plywood: ⅜-inch on the sides, ½-inch on the top, 1-inch on the bottom. Motion picture cameras and aircraft instruments are other items shipped by Lyon in fir plywood containers.

DFPA® TESTED QUALITY

FIR PLYWOOD

means quality construction

FOR MORE INFORMATION about uses shown above, design and/or specification data, mail coupon ⟶



1. SPECIFY BY DFPA QUALITY TRADEMARKS

DFPA grade-trademarks appear only on plywood manufactured, inspected and scientifically tested under the DFPA quality control program. DFPA, Douglas Fir Plywood Association, is a non-profit industry organization devoted to product research, promotion and quality maintenance.

2. CHOOSE THE RIGHT GRADE FOR EACH JOB

Fir plywood comes in two types: 1. *Exterior* (waterproof glue for permanent exposure to water or weather); 2. *Interior* (moisture-resistant glue) for indoor uses, crating, sheathing, maintenance. Within each type are several grades – i.e., panels with one good side, two good sides. Most popular grades are shown below.

EXT-DFPA

Exterior plywood for permanent outdoor uses

PLYPANEL

PlyPanel® for paneling, most indoor uses

PLYSCORD

PlyScord® is unsanded panel for sheathing, crating, bins, etc.

PLYFORM PLYFORM

PlyForm® concrete form grades come in Exterior and Interior types.

SPECIALTY PANELS include 1. *Overlaid Exterior plywood* (hard, smooth, abrasion-resistant fused resin-fiber surfaces) for siding, signs, tanks, concrete forms; 2. *Textured panels* with smart grooved, brushed or striated surfaces for fixtures, siding, special decorative effects.

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Wash. (Good USA Only) Dept. 180
☐ Please send basic fir plywood specification data.
☐ Also send information about use of fir plywood
for.....
Name.....
Firm.....
Address.....
City..... Zone.... State.....

For more facts circle 627 on Reply Card

NEW PRODUCTS

(Begins on page 200)

signed to detect jamming, tool wear, faulty lubrication, and to stop the machine or sound an alarm. Connected to a recorder, TorqueTrol registers length of time the tool has been used, indicates when the machine performed work and when it idled. Connected to a counter, it counts machine's work strokes, thus counts number of parts produced. According to company, TorqueTrol can tell when a pump is "gummed up" or overloaded; control rhythm of step drilling and start the chip clearing cycle.

Here's how it works: Any abnormal condition in the machine operation increases the torque and load on the motor shaft. This causes an increase in the power used by the motor. TorqueTrol monitors the electric power, detects this increase and stops the machine—in milliseconds, says manufacturer. TorqueTrol responds to power (watts) rather than current as do many overload controls. Power increases rapidly with overloading, so that even a small change can be detected. Voltage range of TorqueTrol is 110-440, a-c, 50/60 cycles. Electronic Control Corp.

40—MASONRY SAW has improved cutting head

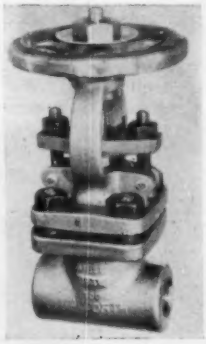
Chief among features announced for the BrikSawMatic is the Full-Vue cutting head, designed to give unlimited vision and unobstructed hand clearance. You can always see what you're

cutting, says manufacturer, and your hand can't jam under the bearing housing. The recessed crank is out of the way, yet readily reached for right- or left-hand use. One operation positions blade height for any size material, it is noted, and there are no angle adjustments to make. This automatic masonry saw is powered by a 2-hp continuous duty, totally enclosed motor reported to develop 5 hp. Eveready BrikSaw Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 275-276. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

41—GATE VALVES for high temperature service

This line of 600-lb steel wedge gate valves is designed for water, steam, gas or air service up to 850 F, and for oil or oil vapor up to 1000 F. Valve has a non-shock pressure-temperature rating of 420 psi at 1000 F and a



rating of 2000 psi at 100 F. Stem, wedge and seat rings are of 13 per cent chromium stainless steel. The wedge has a hardness of 500 Brinell, and is guided by ribs in the body. All valves in the line are of the outside screw and yoke type, and are designed to permit repacking under pressure when fully opened. Repacking is made easy by the curved yoke arms and swing type eyebolts which provide free access to stuffing box. Valves are available with screwed or socket welding ends. Those with union bonnet come in eight sizes, ¼ to 2 in.; with bolted bonnets, six sizes ½ to 2 in. Walworth Co.

42—CHEMICAL SPRAY protects the outdoor storage piles

Permaspray is reported to blanket and protect outdoor storage piles of bulk materials against weather conditions for periods up to a year or more. The product is a colloidal suspension in water of a chemical which forms a tough, flexible, water-resistant film when exposed to air and hardened. It is suggested for coating stock piles of coal, ores, coke breeze, flyash, sulfur, other materials in dead storage. Manufacturer says the deposited film resists action of wind, rain, frost and heat, and stops dust nuisance and windage loss. By stretching and deforming in

FORGED STEEL FOR SURPLUS STRENGTH

NEW NOELTING H 1600 HEAVY DUTY

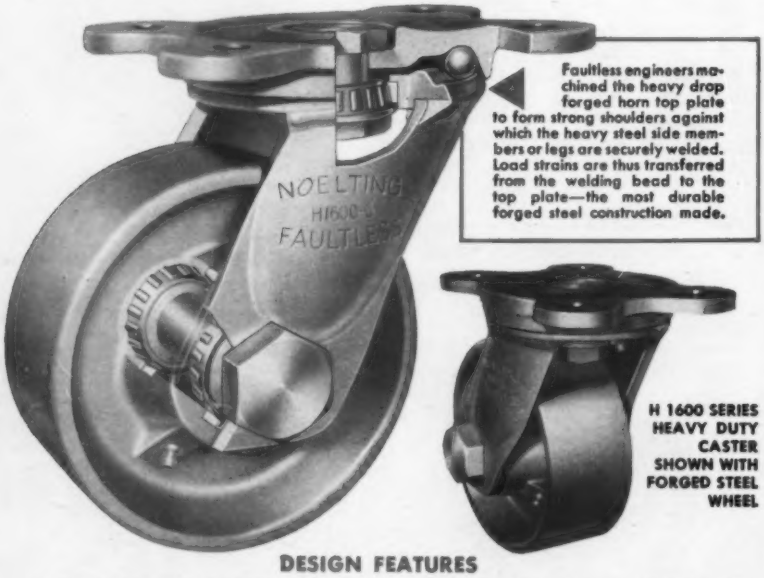
Faultless CASTER

EXCLUSIVE HORN CONSTRUCTION RESISTS SHOCKS

Faultless design engineers drew on a background of more than fifty years experience with caster problems when they perfected an exclusive heavy duty horn design pronounced the most durable forged steel construction ever offered in a caster.

Cutaway illustration shows the large diameter raceway and large ball bearings that carry the load around machined hardened surfaces. A Timken combined radial and thrust bearing is nested in the horn top plate.

If your movements of excessively heavy loads are encountering high impact shocks, your problem will be solved with this new H1600 Series Forged Steel Caster. Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. Call him today about this new H1600 Series Caster.



Faultless engineers machined the heavy drop forged horn top plate to form strong shoulders against which the heavy steel side members or legs are securely welded. Load strains are thus transferred from the welding bead to the top plate—the most durable forged steel construction made.

H 1600 SERIES HEAVY DUTY CASTER SHOWN WITH FORGED STEEL WHEEL

DESIGN FEATURES

1. HEAVY DROP FORGED CASTER TOP PLATE machined for load bearing balls.
2. HEAVY DROP FORGED HORN TOP PLATE machined for load and thrust bearing raceways.
3. SWIVEL HEAD consists of a complete row of hardened ball bearings operating in lubricated machined raceway and Timken combined radial and thrust bearing. Raceways case-hardened.
4. CASTER HORN LEGS made of heavy steel, deeply embossed and formed for additional strength. Embossing forms shoulder to prevent axle from turning.
5. ADJUSTABLE KING BOLT 1" in diameter, assembled with lock-nut and securely staked.
6. AXLE BOLT 1" in diameter. Bolt head held against horn embossing shoulder to prevent axle turning. Heavy duty lock nut is standard.
7. WHEEL—Forged steel wheel supplied in 6" size. Semi-steel wheel supplied in 8" size. Vulcanized rubber tread wheel supplied in 6" and 8" sizes. Roller bearing standard in all wheels. Timken tapered bearings can also be supplied in forged and semi-steel wheels.
8. GREASE FITTINGS easily accessible for fast, thorough lubrication of swivel head and wheel.
9. FINISH—lustre green lacquer.

FAULTLESS CASTER CORPORATION
EVANSVILLE 7, INDIANA

For more facts circle 628 on Reply Card

NEW PRODUCTS

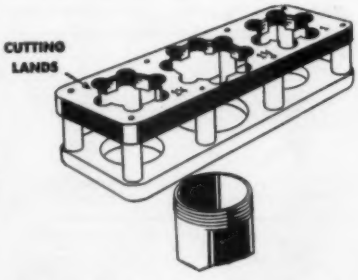
(Begins on page 200)

heat and cold the film remains unbroken, it is explained; thus it drains away water which would ordinarily seep into the stored materials and reduces normal winter damage. It is also claimed to eliminate guttering often caused by heavy rains.

Permaspray is described as nontoxic, non-corrosive and having no adverse effect on burning qualities of coal. When the surface film is broken, as when coal is withdrawn, the area can be redressed and coating applied. The product has the approximate consistency of water, and can be handled in any type of spray equipment with the exception of very coarse or very fine nozzles. It is applied at the rate of one gallon to 100 sq ft. Film sets in 24 hr under normal conditions. The Johnson-March Corp.

43—THREADING TOOL for three sizes of tubing

Made especially to thread three sizes of brass tubing, this 3-in-1 Tube Threading Tool features a holder designed to assure a proper grip on tubing being threaded. The tool has



three dies that cut a 27 thread per inch on 1 in., 1-¼ in. and 1-½ in. brass tubing. Its 1-in. and 1-¼ in. dies have six cutting lands; the 1-½ in. die has eight. A companion unit, the 5-in-1 Tubing Holder, grips ¼ in., 5/16 in., 1 in., 1-¼ in., and 1-½ in. tubing in a rigid position for either threading, cutting or flaring. It consists of two parts locked together by wing nuts and, when clamped in the jaws of a vise, holds tubing firmly without damaging or distorting it. J. A. Sexauer Mfg. Co., Inc.

44—VACUUM CLEANER for both wet and dry pick-up

This heavy-duty Hydro-Jet industrial vacuum cleaner will pick-up 12 gal of liquid, or 1½ bushels of dry material. It is reported to be one of the lowest priced vacs with such a large recoverable capacity, equipped

For more facts circle 629 on Reply Card →

On the Monongahela . . . New fireboat has Multigrip Floor Plate decks for all-weather safety!

The C. D. SCULLY, new Pittsburgh fireboat, has Multigrip Floor Plate on all exterior decks and ladders. Hull is made entirely of ¼-inch USS "COR-TEN" High Strength Steel.

On Pittsburgh's new 65-foot fireboat, the C. D. SCULLY, all exterior decks and ladders are surfaced with USS Multigrip Floor Plate. Mr. Leo Gill, Director, Automotive Equipment, City of Pittsburgh, says that "safety and endurance dictated the choice." In the event of river or wharfside fires, the *"Scully"* will run in close, directing gushing streams of water into the fire. Wind-blown spray *could* make this a treacherous job for firemen manning the equipment.

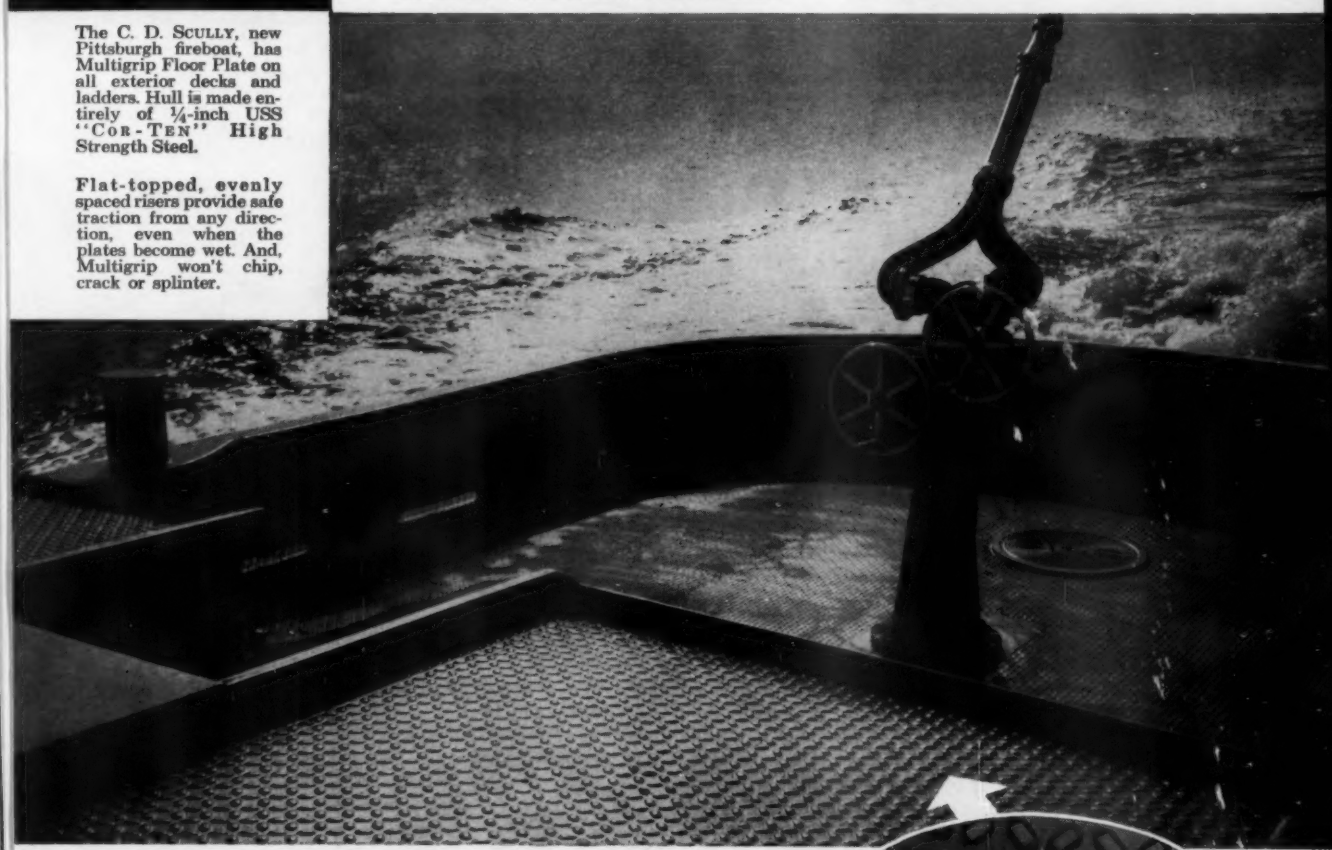
Risers Mean Safe Footing

Because Multigrip has clean-edged, flat-topped risers that are evenly spaced, firemen will be able to move about the decks safely, even when the plates are wet. In short, use of Multigrip has made the *"Scully"* a safer, more efficient fire-fighter.

Your Plant, Too

This application demonstrates how Multigrip adds long-lasting safety under extreme conditions, just as it can in your own plant. You'll find that Multigrip won't chip, crack or splinter, and it offers traction from any direction. Multigrip can be cut, welded or bent where necessary . . . and installation is *fast!* And large plates mean less installation waste. For safety and long service, specify USS Multigrip Steel Floor Plate for trucking aisles, ramps, loading platforms, stairs and entire floor areas.

Flat-topped, evenly spaced risers provide safe traction from any direction, even when the plates become wet. And, Multigrip won't chip, crack or splinter.

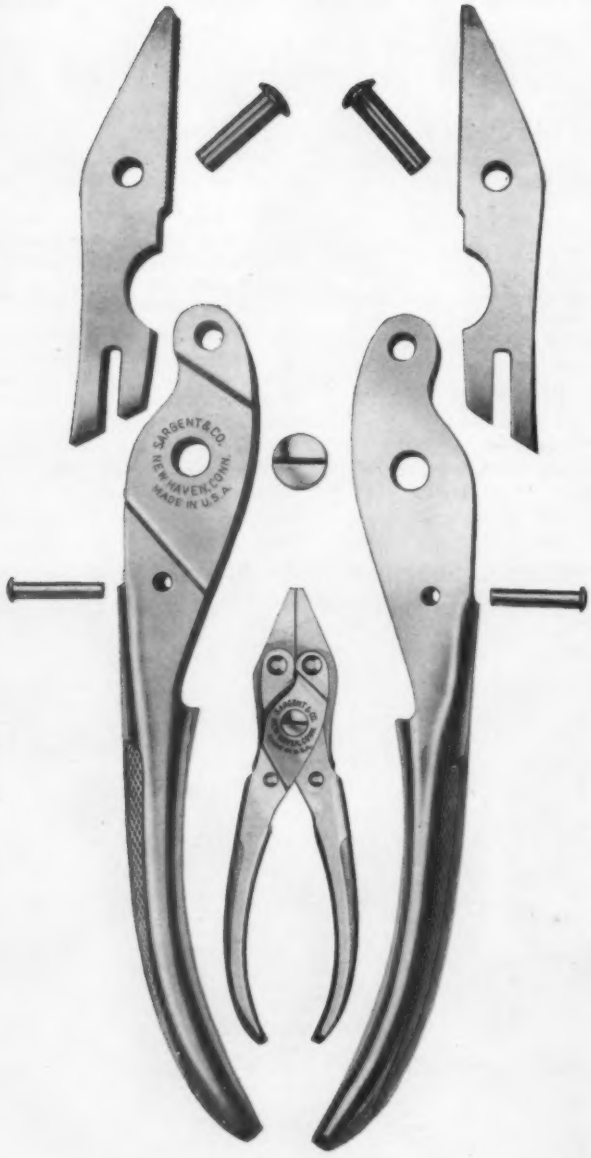


USS multigrip FLOOR PLATE

Sold by leading distributors from coast to coast 7-481

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL



TAILORED TO YOUR JOB

Sargent **PARALLEL ACTION** Jaw Pliers provide strongest, uniform gripping area, ideal for precision work. Compound leverage, convertible frames offer complete adaptability to your needs. Open throat design greatly increases utility. Jaws, handles, rivets and springs are available all or in part, assembled or unassembled. Blank, nickel-plated, soft and smooth jaws. Low prices—based on minimum production quantities . . .

Send us your work sample or blueprints for estimate without obligation. Your local industrial distributor carries the standard line of Sargent hand tools. Write for catalog.

SARGENT & COMPANY
Hand Tool Div., New Haven 9, Conn.
For more facts circle 630 on Reply Card

NEW PRODUCTS

(Begins on page 200)

with a moisture-proof, by-pass motor for wet pick-up. The unit is equipped with an automatic control shut-off, and a quiet, heavy-duty motor that develops a 63-in. water lift. Its square tank provides added stability and strength it is noted,—makes possible 25 per cent greater capacity than round container of same diameter and height. Of heavy-duty reinforced steel, it has quick-coupling attachments, that snap on and off, available for wet or dry floor and carpet cleaning, and for most other general cleaning and maintenance operations. The machine is optionally available with larger rear wheels, transport handle, tool storage basket, and stainless steel tank. Advance Floor Machine Co.

45—LUG KIT permits adding sub-feeds to panelboards

This sub-feed lug kit makes it possible to add sub-feeds to standard NQO circuit breaker lighting panelboards. The kit is available for both 100- and

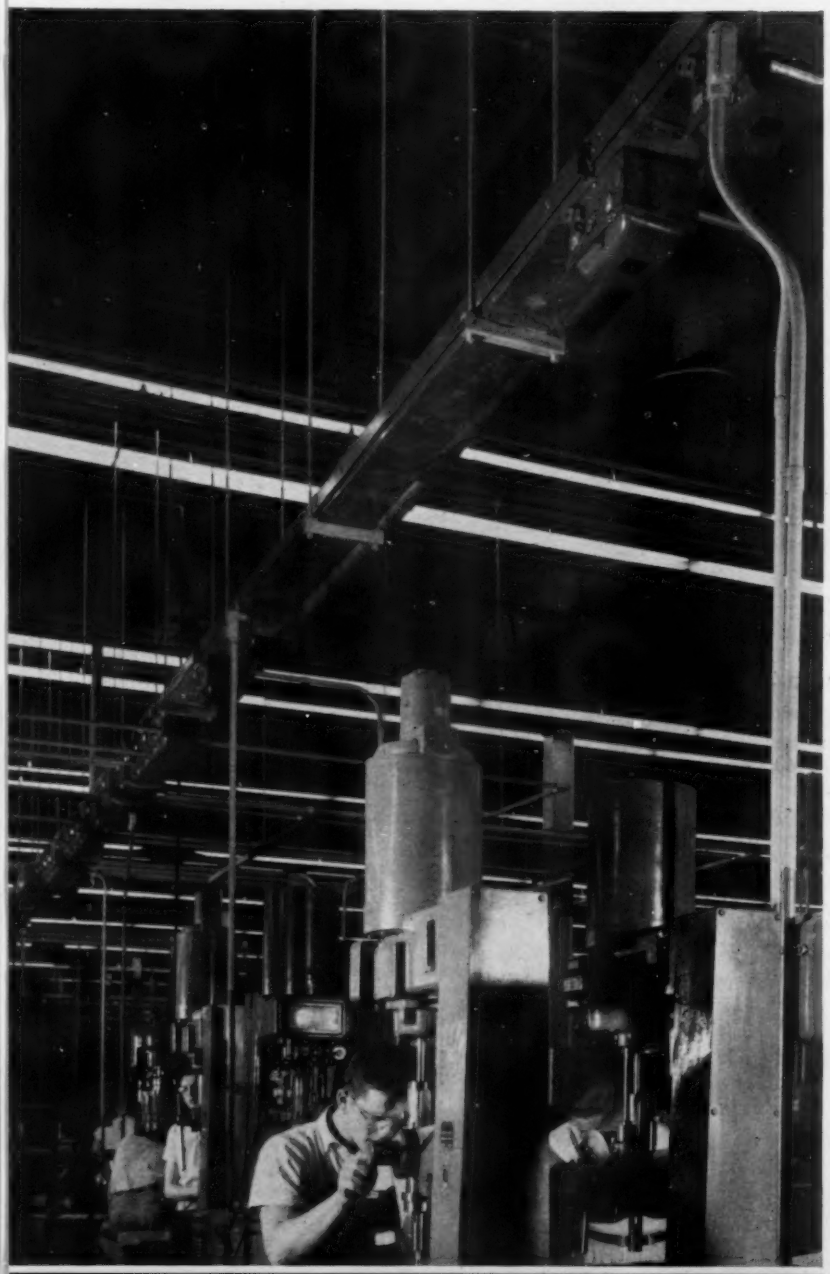
200-amp main lug only panelboards and includes necessary parts to allow simple conversion of the standard merchandised panelboard. Together with the three-pole QO breaker, the sub-feed lug kit allows the majority of panelboard problems, which formerly required special factory construction, to be solved from local distributor stocks. Square D Co.

46—SHAFT-MOUNTED DRIVE offers larger capacities

The all steel 315J Shaft-Mounted Drive is available in single reduction ratio of 5:1 and in two double reduction ratios of 14:1 and 25:1. Unit ratings range from 2 hp at 5 rpm to 50 hp at 359 rpm; maximum torque rating at low speed shaft is 31,000 lb-in. A longer control distance between shafts permits use of larger sheaves on installations where unit is mounted with input shaft toward driven ma-

EXPANSIBLE

PROVIDE NOW FOR INCREASING LOAD DENSITY WITH A MODERN GENERAL ELECTRIC POWER DISTRIBUTION SYSTEM



To satisfy fast-growing loads of new or existing plants, power systems must have built-in expansibility. G-E busways, for example, are designed for adding circuits easily to meet shifts in load concentration. Other expansible G-E system components are available to serve your power needs. Contact your nearest G-E Apparatus Sales Office or send coupon for expert help in system planning.

EXPANSIBLE interlocked armor cable is easy to relocate to meet load shifts. Flexibility, lighter weight cut installation time.

EXPANSIBLE features of quiet Type M transformer—ratings to 150 kva, all-position mounting near load—allow wide use.

GENERAL ELECTRIC

To help make your plant's power distribution system

• EXPANSIBLE • SAFE • RELIABLE

• FLEXIBLE • ECONOMICAL

Write to General Electric Co., Sect. C680-9, Schenectady 5, N.Y. for:

☐ G-E Power Distribution Library

☐ Information on color movie "Goodbye Steve", the industrial power story.

NAME_____

COMPANY_____

ADDRESS_____

For more facts circle 631 on Reply Card

NEW PRODUCTS

(Begins on page 200)

chine or on through-shaft applications. Inspection covers on the three-wall one-piece steel housing provide easy inspection of bearings and helical gears. An automotive type dip stick is provided for oil level check. Bulletin 7100 gives details. The Falk Corp.

47—DRAFTING BOARD ROLL handles the long drawings

Making long drawings in one continuous piece is easier with the Rollo-Draft. Operating on the same principle as the roll film camera, this attachment is designed to keep drawings of any size smooth and taut without tacks or tape. Manufacturer points out that it eliminates splicing

sections together for continuous feeding through blueprint machine and pays for itself in time and drafting paper saved. Rollo-Draft consists of two tubes; one holds fresh drafting or tracing paper. As each section of a drawing is finished, it feeds onto the roll mounted at the opposite side of the board. When the entire drawing is finished, the tube on which it has been rolled is removed from its holder and taken directly to the blueprint machine. Paper can be moved right or left by means of cranks on either side and locked into position. Rollo-Draft can be installed on a board with drill and screw driver. Set for use on a 36-in. board costs less than $90; there's a 42-in. board set, too. Aqua Sportsman, Inc.

48—TIME SWITCHES for both indoor and outdoor use

Available in both indoor and outdoor models, these time switches feature a 24-hr dial which can be used for as many as 12 on-off operations in a day, with trippers set as close as 1 hr apart. The indoor model, TSA-47, is designed for flexibility, with both double and single pole contacts available. It is declared capable of withstanding 350 amp of inrush current. Applications include floodlighting, heating, air conditioning, refrigeration and motor starting.

The outdoor switch, TSA-41, is for use where a heavy duty outdoor case is required, including applications involving outdoor lighting, capacitor switches, heating, pump control. An omitting device is available for skipping a day or more of operation when desired. Three switching arrangements are available, double-pole, single throw; single-pole, single throw; and single-pole, double throw. General Electric Co.

49—ADHESIVE makes Teflon stick to Teflon, metal

For binding Teflon to Teflon, or Teflon to metal and other materials, Flexrock 80 is a pressure sensitive adhesive. Tests are reported to indicate a peel strength of over 1000 grams per inch or a direct pull of 12 to 15 psi for Teflon to Teflon or to stainless steel. It is also reported that this adhesive has good acid and alkali resistance and excellent electrical properties. It can be applied by dipping or spraying, and for small applications brushing is declared adequate. After the adhesive has been applied to the Teflon, it should be dried before pressing parts together. Air drying is satisfactory, but takes several hours. This can be reduced by heating 15 to 30 min at about 210 F. Heating for 5 min at 300 F is said to result in greater strength. Flexrock Co.

50—SWING CHECK VALVE has renewable disk

This bronze swing check valve, the Fig. 0630, features a renewable composition disk. Manufacturer notes that swing check valves are generally recommended for service on liquid lines where full unobstructed flow or minimum resistance to flow is desired. The renewable composition disks serve to protect the valve seat from damage due to pulsating pressures affording considerable savings in replacement costs to users. The disk can be replaced without remov-

G-B SNAP-ON DISTRIBUTORS

(See ad on facing page)

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, Ball Distributing & Engr. Co.
ATLANTA, Ga., Southern States Iron Roofing Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply
Southern States Iron Roofing Co.
BROOKLINE, Mass., Homans-Kohler, Inc.
BUFFALO, Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHARLOTTE, N. C., Guy M. Beaty & Co.
CHATTANOOGA, Guy M. Beaty & Co.
CHICAGO, E. C. Carlson Co.
CINCINNATI, R. E. Kramig & Co.
CLEVELAND, The Miles Materials Co.
COLUMBIA, S. C., Southern States Iron Roofing Co.
COLUMBUS, Santeler Brothers
DALLAS, Insulation Supply Co., Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DETROIT, Coon-DeVisser Co.
EL PASO, Insulation & Specialties Co.
FARGO, N. D., Smith, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
JACKSON, Miss., Paine Refrigeration Supply Co.
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Kelley Asbestos Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Southern States Iron Roofing Co.
MINNEAPOLIS, Asbestos Products, Inc.
MOBILE, Ala., Shook & Fletcher
NASHVILLE, Southern States Iron Roofing Co.
NEWARK, N. J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PITTSBURGH, Dravo Corp.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
RALEIGH, N. C., Southern States Iron Roofing Co.
RICHMOND, Va., Southern States Iron Roofing Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Southern States Iron Roofing Co.
SEATTLE, Western Fibrous Glass Products
SOUTH BELOIT, Ill., Mott Brothers Co.
ST. LOUIS, A. G. Brauer Supply Co.
ST. PAUL, Asbestos Products, Inc.
SYRACUSE, N. Y., Industrial Supply Co.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TALLAHASSEE, Fla., Baker's, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
WASHINGTON, Walter E. Campbell Co., Inc.
WICHITA, Jamar-Olmen Construction Co.
VANCOUVER, B. C., Fleck Brothers Limited

GUSTIN gb BACON

*Ask the man on the scaffold about SNAP*ON . . .*

. . . and he'll tell you it's the perfect insulation for plant piping. Easy to cut. Easy to snap on. Flexible. Clean and dustfree. Reusable. Light as a feather. And don't forget—this one-piece pipe insulation molded of fine glass fibers has the *highest thermal efficiency* of any insulation for cold or hot piping up to 350°!

Snap*On is available in one-piece sections . . . in sizes up to 33" . . . plain or with a complete range of factory-applied jackets for appearance, vapor barrier or weatherproofing. It is stocked by a nation-wide network of G-B distributors. See adjoining column for name of your local distributor or write for complete information.

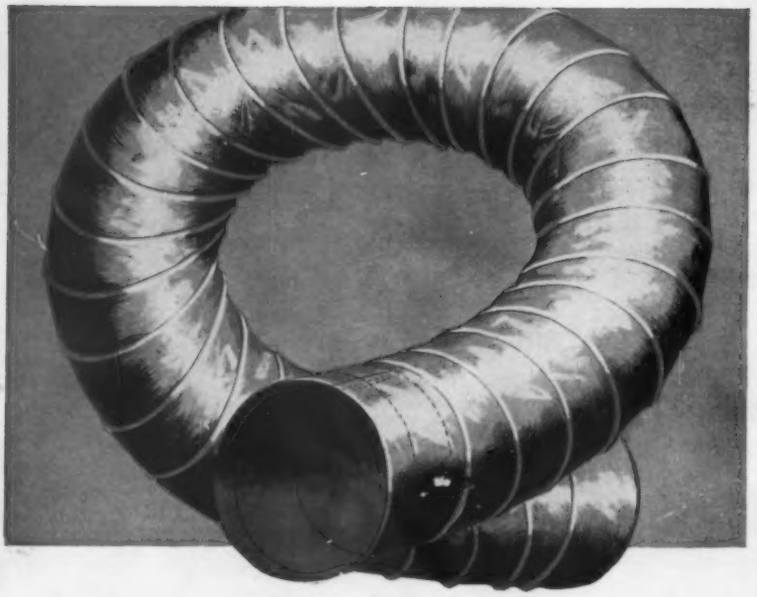
*Trademark Reg.

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

244 W. 10th St., Kansas City, Mo.

For more facts circle 632 on Reply Card



facts about Spiratube®

that will help you solve your ducting problems

What is Spiratube?

A flexible, lightweight duct made of continuous helical coils of spring steel reinforced with overlapping plies of tough, multi-coated fabric.

What are its applications?

Spiratube is used for the removal of air, gases, liquids and many solids at low pressure. Its installation can be either portable, permanent or temporary.

How flexible is Spiratube?

It will take tight turns at any point up to 180° without buckling. No elbows or fittings are required.

How much abuse can it take?

Plenty. The fabric in Spiratube is extremely rugged. Flex tests run to 280,000 times without apparent wear.

Are there different types of Spiratube?

Yes. Five different types . . . available in a variety of covers and in sizes from 3″ to 30″ I.D.

What about installation?

Sections of Spiratube can be linked together or detached in a matter of seconds without the use of tools. If machine changes are made, Spiratube can be assembled and disassembled and re-used over and over again.

How can I make sure that Spiratube will solve my problems?

Write us, outlining your requirements. Our engineers will be glad to put their experience to work for you. Write Dept. 90.

Sold through industrial distributors from coast to coast.

Flexible Tubing
CORPORATION

GUILFORD, CONNECTICUT • LOS ANGELES 64, CALIFORNIA

For more facts circle 633 on Reply Card

NEW PRODUCTS

(Begins on page 200)

ing the valve body from the line. They are regularly furnished in a medium-hard type for liquid service and steam disks are also available. The valves, rated at 150 lb steam working pressure, 300 lb cold water, oil or gas, come in sizes from ½ through 2 in. The Fairbanks Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 275-276.

51—COUPLING METHOD for joining light tubing

Vic-Easy is announced as an economical method of quick coupling thin wall steel and aluminum pipe and tubing. The method, which utilizes quick couplings assembled on grooved pipe ends, is reported to provide leak-tight connections. (Several mills can supply a wide range of wall thicknesses and weights of tubing and pipe with Vic-Easy rolled grooves.) There is no loss of metal in the rolling, it is claimed, and the pipe or tubing is as sound structurally as when manufac-

tured. The Vic-Easy Method is for thin wall pipe and tubing in sizes from 1¼ to 12 in., and may be used for working pressures to 1000 psi, depending on wall thickness of tubing and type of coupling used.

Economies reported include greater speed and fewer man hours for piping installations—one man can make the joint. Also, savings are realized with the lower initial cost and lower transportation costs of the lightweight tubing. And the method lets you select pipe rated for the job requirements. Coupling is declared quick and easy. When tubing ends are brought into position, a gasket, furnished with the coupling, is slipped onto one of the pipe ends. It is then positioned over the gasket and fastened. The joint is flexible, allowing some deflection in any direction. There are three types of couplings. A snap-joint type, a hinged assembly fastened by leverage and tension, requires no tools for installation. Requiring only a wrench

WHY OPERATE A *BIG* BOILER TO TAKE A SHOWER...

?

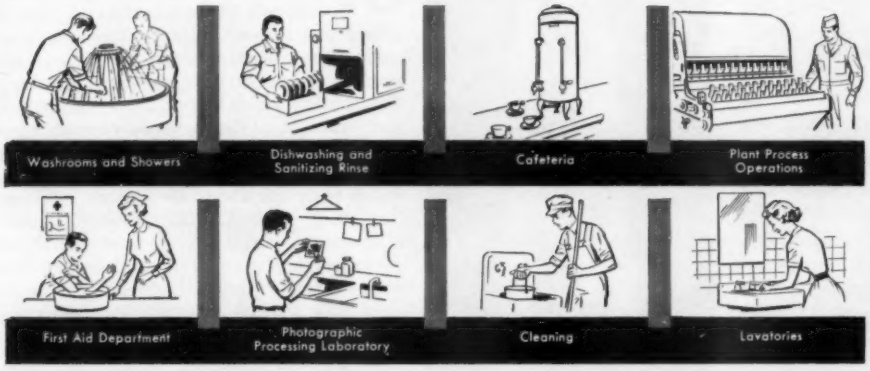
A.O.Smith

Burkay

INDUSTRIAL GAS-FIRED

WATER HEATERS

can be "spotted" wherever hot water is needed



Save on BTU's . . . Save on Dollars . . . Save on Maintenance with Burkay Gas-Fired Automatic Water Heaters

Large cost reductions can be made in hot water generation by using *Burkay* units. Located strategically, *Burkay* water heater systems provide all the right temperature hot water required for general use and processing needs.

With *Burkay* heaters you cut back the operation of expensive boilers, and in some cases dispense with them entirely . . . thereby reducing overhead, labor, maintenance costs and long hot water lines.

As single units or in "banks" as required, *Burkay* water heaters meet all hot water demands economically.

Highly efficient heat exchanger, rust-free water, minimum of maintenance makes the *Burkay* a popular unit among plant managers. Call on your nearest A. O. Smith-*Burkay* distributor, or your local gas utility to help you.

Burkay industrial water heaters have all-copper waterways. Are rust-free, corrosion-free, leakproof. Are tested at 550 psi. Dependable. Sturdy construction. Compact. Economical operation. Operate on all gases. A.G.A. and A.S.M.E. approved. Completely automatic with suitable thermostats. Guaranteed by A. O. Smith, world's largest water heater manufacturer.

Write FOR COMPLETE INFORMATION

Through research ... *a better way*

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PERMAGLAS DIVISION · KANKAKEE, ILLINOIS
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A. O. Smith Corporation
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Kankakee, Illinois
Gentlemen: Please send me booklet, "Hot Water for Industrial Plants."

Name.....Title.....
Company.....
Address.....
City.....Zone....State.....

makers of famous **Permaglas®** *glass-lined water heaters...* **Permaglas®** *heating and cooling*

For more facts circle 634 on Reply Card

HOW Westinghouse

JOB-TAILORED FLUORESCENT LAMPS MEET YOUR LIGHTING NEEDS

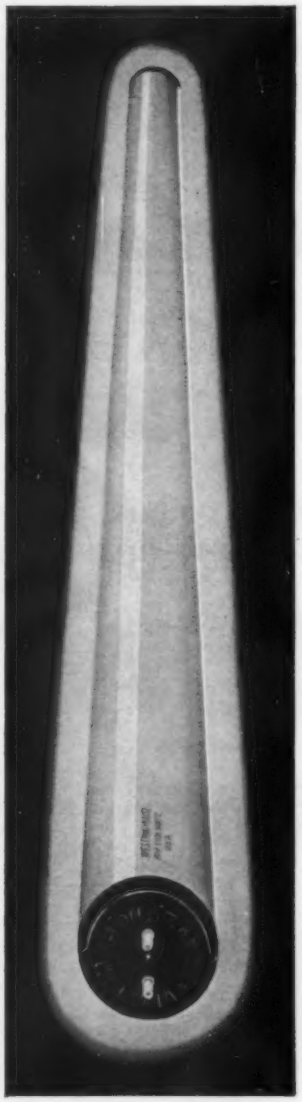
...all with ULTRALUME™ High-Intensity Phosphors • MORE LUMENS PER WATT... more light for your dollar • UNIFORM END-TO END LIGHT • PERFECT COLOR MATCH...ALWAYS • MAXIMUM OUTPUT MAINTAINED THROUGHOUT LONG LIFE

1. New SUPER-HI Fluorescent lamps produce more than twice the light per foot. Designed primarily for high bay (20 feet or higher) industrial and outdoor lighting, a new line of extra high light output fluorescent lamps produce more than twice as much light output per foot as standard fluorescent lamps. The new SUPER-HI lamps permit extremely high energy loading of electrodes, the arc stream and the phosphor. This gives you high light output with new economy at good efficiency and long life.

SUPER-HI lamps are light in weight, convenient to handle and provide a light source subject to the same easy optical control as with present standard T12 lamps, but with over twice the light output. Available in 105, 155, and 205 watts, 4, 6 and 8 ft. The lamps have a rated average useful life of 5000 hours, deliver 6000 to 13,000 initial lumens.

2. High Output Rapid Start lamps give more than 50% more light than regular type. Designed primarily for medium-high bay (15 to 20 feet) industrial and outdoor lighting, four new sizes of Westinghouse high output, rapid start fluorescent lamps can produce over 50% more light than comparable sizes of regular lamps and offer new economy and effectiveness to fluorescent lighting. These lamps provide increased lighting levels, make installations with adequate footcandle values of deluxe color light more practical, and improve the economy and practicability of fluorescent lighting at higher mountings and at lower ambient temperatures.

These lamps are available in 24", 48", 72" and 96" T12 design for general indoor use and for outdoor service where retention of light output at low temperatures is essential. The 72" T12 is recommended for street lighting.



3. Reflector-Fluorescent lamps produce 60% more directed light. For use where external reflectors are difficult or impractical to use, or where dirt deposit cuts lighting effectiveness, these Westinghouse Reflector-Fluorescent lamps provide a directional light distribution which helps put the light where you want it. This is accomplished by a built-in reflecting surface, extending the length of the lamp on the inside of the tube, which redirects about 60% extra light out the other side. Westinghouse Reflector-Fluorescent lamps are recommended for use in coves, showcases and other locations where space is limited. Indirect lighting effects may also be obtained by aiming the lamps toward the ceiling.

They also solve special lighting problems including temporary lighting for construction projects, displays, and exhibits.

Westinghouse Reflector-Fluorescent lamps are available in 40 watt rapid start, 48" and 96" T12 slimline types.

4. Beauty Tone™ Home-line Fluorescent lamps with warm white deluxe color. The same new Westinghouse "Beauty Tone Home-line" lamps which are revolutionizing home lighting by providing warm white deluxe illumination are also ideal for offices, stores and wherever "friendly" color of light is wanted to flatter complexion, enhance the natural color of furnishings, decorations, and displays, and blend well with incandescent lighting.

There's a network of Westinghouse distributors ready to serve you. Call your nearest Westinghouse Supplier for a free Job-Tailored Survey of your lighting requirements. Or write Westinghouse Lamp Division, Bloomfield, N. J.

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 635 on Reply Card

NEW PRODUCTS

(Begins on page 200)

for installation are a lightweight, economical coupling for low pressure, low external stress application, and a heavy-duty coupling suggested for use where high external stress or high internal pressures are expected. Victaulic Co. of America.

52—PLASTIC LINER for the steel cylindrical tanks

This liner, of ¼-in. polyethylene, is intended for steel cylindrical tanks having a flat bottom and no inside metallic welds. It is offered as a means of in-plant handling and storage of corrosive liquids in steel containers. Company points out that use of polyethylene liners in such tanks has been difficult because the convex bottoms of these containers could not support the weight of the liner when filled; and spray coating of the interiors with thermoplastics was not feasible because of inability of the coating to penetrate areas adjacent

to bottom chime. The liner shown was made for a 55-gal steel tank for sulfuric acid storage—other applications include metal cleaning, de-greasing and similar applications. Tanks can be furnished already lined, or the liner can be fabricated to specification and inserted by user. The liner has a roll lip to cover the top edge of the steel supporting the drum to avoid spillage of liquid between liner and container. American Agile Corp.

53—FHP MOTOR for abnormal operating conditions

Form G motors are severe-duty, single phase 60 and three 60/50 cycle motors, designed for applications where operating conditions are abnormal. Typical instances in this category include the powering of food processing equipment where motors are hosed down on a regular basis, and motor installations in the plating industry

Parts Interchangeable ON

CHEMPRO "Wedge-Lock"

EXTERNAL AND INTERNAL SEALS

Chempro "Wedge-Lock" Line of external and internal mechanical seals is now completely interchangeable in parts, with the exception of the stator bushing, for any given shaft size. This important cost- and time-saving feature is another Chempro FIRST, resulting in

- Savings Through Reduction in Spare Parts Stock
- Gives You More Insurance Against Down-time

Chempro "Wedge-Lock" Seals give highly economical service on pumps handling acids, caustics and other liquids and slurries at temperatures from −80° F. to 500° F., from vacuum to 100 psi. Seal faces are always within the stuffing box, eliminating dangerous spray hazards.

other CHEMPRO ADVANTAGES

1. Simple In Design—Only 8 Parts
2. Installed In Only 20-30 Minutes
3. Seals Completely Interchangeable With Packing
4. Low Power Costs—Minimum Friction Load
5. Flushing, Cooling and/or Lubricating Can Be Supplied On All Seals

Write for Bulletins CP551 and 575

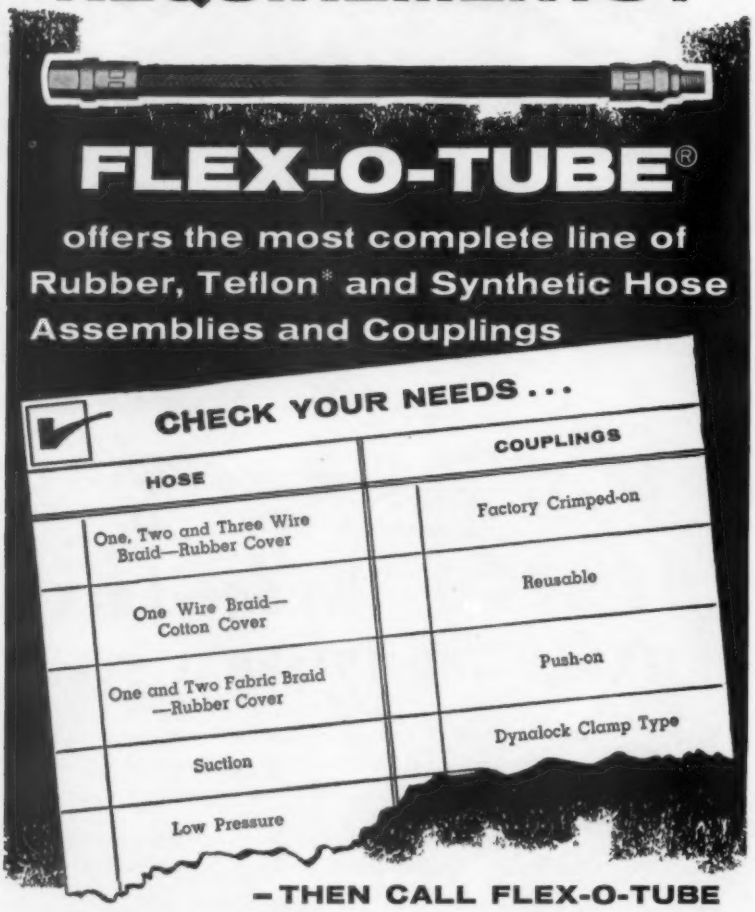
CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N. Y.

For more facts circle 636 on Reply Card

What are your HYDRAULIC HOSE REQUIREMENTS?



—THEN CALL FLEX-O-TUBE

At Flex-O-Tube you'll find the finest and most complete selection of hydraulic system components . . . all manufactured of top quality materials. The inner tube of Flex-O-Tube hose is composed of a seamless synthetic compound resistant to petroleum products, common hydraulic fluids, water and air. A wide variety of reinforcement and outer covering combinations are available.

Flex-O-Tube offers four kinds of fittings and couplings. (See chart above.) These are available in all standard connecting types.

Remember, for all your hydraulic hose and coupling requirements —write or phone Flex-O-Tube First!

When your requirements call for metal, specify Flexon Flexible Metal Hose, available in a complete range of sizes and types.

*Du Pont Trademark

H-6

FLEXON® QUALITY
proved in service and backed by over 55 years manufacturing experience

Flexonics *Corporation*
FLEX-O-TUBE DIVISION
1340 S. THIRD AVENUE, MAYWOOD, ILLINOIS
FORMERLY CHICAGO METAL HOSE CORPORATION
Manufacturers of flexible metal hose and conduit, expansion joints, metallic bellows and assemblies of these components.
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

For more facts circle 637 on Reply Card

NEW PRODUCTS

(Begins on page 200)

which do not require the explosion-proof feature. Among the features cited are: totally enclosed non-ventilated construction, base welded to stator shell, stainless steel shaft, cast-iron end shields, and corrosion-resistant finish on internal and external surfaces. Stator windings are protected by special insulation and double varnish impregnation. Motor is available in horsepower ratings of 1/6 through ¾ and in speeds of 3450, 1725 and 1140 rpm. General Electric Co.

54—GREASE CUPS improve machinery lubrication

Greasing by guesswork of electric motors, pumps, blowers, shafts, fans and other machinery is said to be eliminated with Visiball Automatic Grease Cups. Heart of this grease cup is a Neoprene disc which can be inflated into a ball, holding up to 2 oz of grease. The disc or ball is filled with

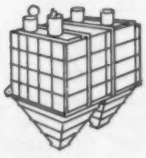
a standard grease gun through a fitting on the side of the chrome plated zinc alloy housing. Protecting the Neoprene ball is a clear Lucite plastic cylinder, through which a maintenance man can see the ball as it fills with grease. As the bearing uses grease, the ball deflates, indicating quantity of grease remaining. It is not necessary to refill the cup with grease until the Neoprene disc returns to the deflated position. Because of the compression of the Neoprene ball and the vacuum created by the motion of the shaft, grease is fed automatically into bearing as needed. Visiball Mfg. Co.

55—LOW PRESSURE SWITCH is economical, sensitive

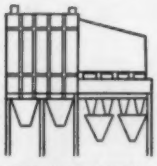
This switch is introduced as an economically-priced, low pressure switch to control or signal small pressures, vacuums or differential pressures. It is suggested for control of movement of roll-type air filters, pressure regu-

Pay dirt!
...year after year!

BUELL CYCLONE



"SF" ELECTRIC PRECIPITATOR



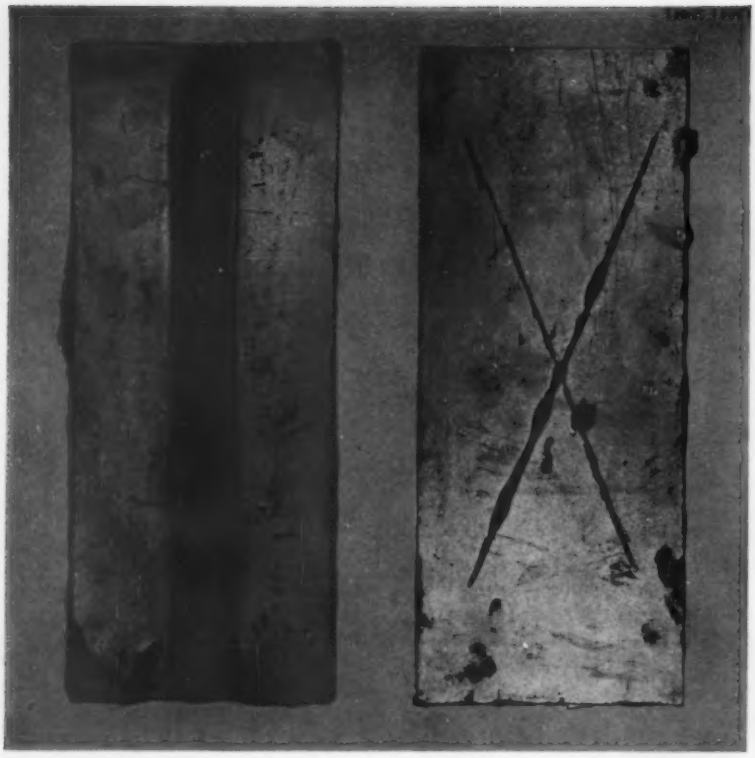
PRECIPITATOR-CYCLONE COMBINATION

Buell Cyclone collectors pay off two ways: extra efficiency from the start . . . and extra years of operation, with little if any maintenance. Unique features like Buell's exclusive Shave-off deliver an extra percentage of dust collection efficiency: in nearly all cases, Buell installations pay for themselves in just a few years. And heavy plate construction, scientific proportioning, side entry of dust-laden gases are reasons why they keep on earning for many, many years. For specific details, write for "The Collection and Recovery of Industrial Dusts". Just write Dept. 14-J , Buell Engineering Company, Inc., 70 Pine Street, New York 5, New York.

buell

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

For more facts circle 638 on Reply Card



CORROSION'S FOCAL POINTS are easy to detect with a new Amercoat testing method using iron and caustic indicators in a saline gelatin bath. On the welded and scored steel panels shown above after test, unworked surface areas turned red to indicate cathodic properties; but the weld, scores and edges turned blue (here shown blackened) to reveal themselves as anodic corrosion breeders. Rivets, threads, crevices and abrasions also show anodic under test. Unless such areas are effectively sealed from moisture, oxygen and ions they will erupt as focal points of corrosion cells.

How to protect "trouble spots" against corrosion

Ask a corrosion engineer where metal corrosion is likely to attack first. Chances are that he will name rivets, threads, sharp edges, angles, crevices and welds. These are the areas of stress concentration, work hardness, fissures and abrasions. They tend to be anodic and actually breed corrosion. And although they warrant increased protection, conventional coatings pull away from their sharp profiles and leave them inadequately covered.

Amercoat No. 87, a true vinyl mastic, protects these spots in a single coat 10 mils thick, whereas other coatings fail to build 5 mils in three coats. It cuts maintenance painting costs up to 50% because you don't have to re-erect staging and scaffolds for additional coats, and you get results that last.

No. 87 combines the time-tested chemical and weather resistance of vinyl coatings with the thickness of mastic, yet it is easily sprayed with standard equipment over a suitable primer. Available in white, gray, black and aluminum. Use it for enduring protection at lower cost per square foot per year. Complete details mailed on request.—Amercoat Corp., South Gate, Calif.

AMERCOAT Corporation, Dept. LJ
4809 Firestone Blvd., South Gate, Calif.

Please send me your latest information on Amercoat No. 87.

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

Amercoat CORPORATION

EVANSTON, ILLINOIS • KENILWORTH, NEW JERSEY
JACKSONVILLE, FLORIDA • HOUSTON, TEXAS

For more facts circle 639 on Reply Card

NEW PRODUCTS

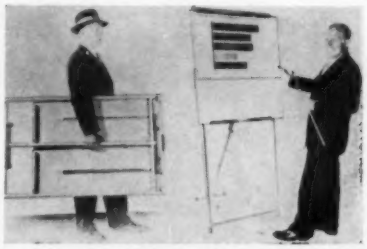
(Begins on page 200)

lation of gas boosters, switch operation of dampers, blowers, gas-fired heaters and similar applications. An independently adjustable automatic reset feature extends use of the switch to many automatic control fields. The switch can be mounted in any position, says company, and its use is not affected by vibrations. It requires only 1½-in. headroom, fits into an area of 3½-by-7½ in. Since there is no flow through sensing element, the connecting tubing may be as small as ⅛-in. ID.

Pressure, vacuum or differential pressure will operate the switch. Normal range is 0.1 to 5.0 in. water; other ranges can be provided. The switch is designed for a-c and d-c use up to 110 v. Circuit is normally open or normally closed, as desired. Bacharach Industrial Instrument Co.

56—ALUMINUM EASEL for those who give talks

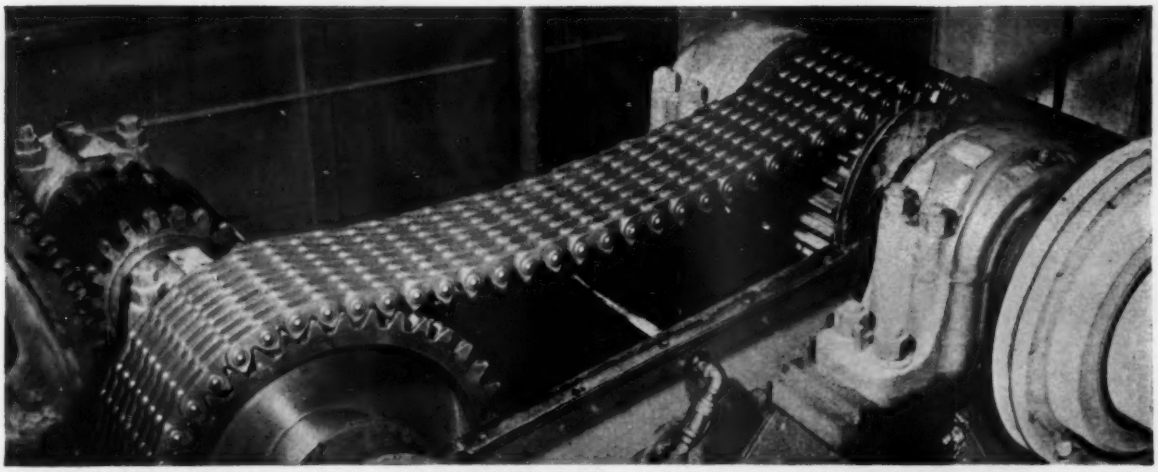
Weighing less than 12 lb, the floor model of this aluminum easel extends to a height of 72 in., closes to 29-by-45



in., provides a work or display area of 27-by-36 in. and can be set up and taken down readily by one person. A smaller model, for desk or table, elevates to 59 in., has a 20-by-30 in. working area and weighs less than 8 lb. Both models adjust easily and hold desired position. The floor type costs around $65, the smaller one, around $45. Chart-Pak, Inc.

57—VERTICAL MOTORS in protected enclosures

Vertical weather-protected motors with enclosures built to NEMA Type II standard are available in squirrel-cage and wound-rotor induction and synchronous types in ratings of 250 hp and up. For outdoor applications on pumps and other vertical drives, motor's ventilating passages are constructed to minimize entrance of rain, snow and airborne particles with baffles to direct flow of air in and out. Intake and exhaust openings to air



HIGH SPEED. Traveling at speeds as high as 5000 fpm, silent chain drives readily accommodate the extreme peak loads without losing their better-than-98% efficiency.

How LINK-BELT silent chain drives survive industry's roughest requirements

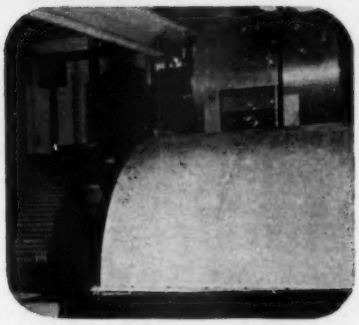
Would your drives do as well?

On applications like these and scores more, no other type of drive is the equal of Link-Belt silent chain. Ask your Link-Belt office or authorized stock-carrying distributor for comprehensive 88-page Book 2425.

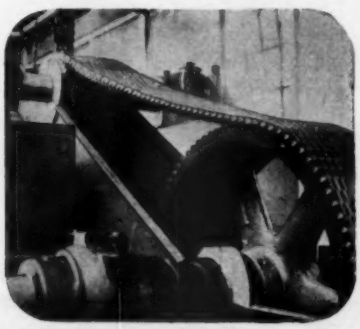
LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,079

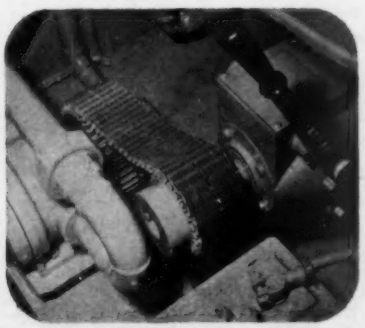


LARGE OR SMALL HP. On a 300 hp drive like this or at fractional hp, silent chain is always lower in ultimate cost.

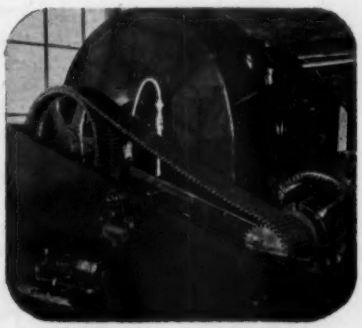


LARGE RATIOS. Link-Belt silent chain operates efficiently on extremely short centers at ratios as high as 10-to-1.

ADVERSE OPERATING CONDITIONS. Heat, humidity and cold have little effect on Link-Belt silent chain drive performance.

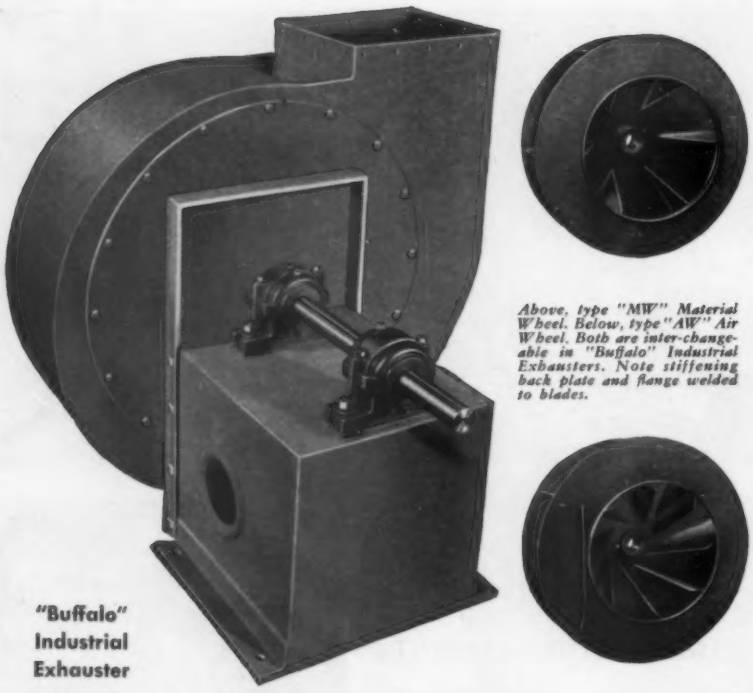


LIMITED SPACE. Easy to assemble in close quarters, Link-Belt silent chain permits built-in drives, compact housings.



LONG LIFE. This drive is 16 years old and still going strong. Not unusual—many others have lasted twice that long.

For more facts circle 640 on Reply Card



Above, type "MW" Material Wheel. Below, type "AW" Air Wheel. Both are inter-changeable in "Buffalo" Industrial Exhausters. Note stiffening back plate and flange welded to blades.

"Buffalo" Industrial Exhauster

BUILT FOR HARD WORK *at low pay!*

"Buffalo" Industrial Exhausters are built for your tough jobs — handling fumes, gases, fogs and dust, often at temperatures up to 900° F. — moving any materials a pneumatic system will carry — induced draft on small boilers — hundreds of other heavy industrial services. They're built to operate *continuously,* too, on minimum driving power and maintenance, thanks to these "Q" Factor* features built into them:

1. ALL-WELDED STEEL PLATE STRENGTH — to take punishment year after year. Oversize anti-friction bearings and shafts.
2. EFFICIENCY — thanks to smooth, air-designed housing and factory-balanced wheels, reducing friction and horsepower requirements.
3. VERSATILITY — available with interchangeable air wheels or material wheels, also heat slinger for high temperature work. Housing readily reversible or adjustable by removing bolts threaded into housing thru side plate.

WRITE FOR BULLETIN 3576 and see the characteristics built into this rugged fan to give you more work for your air dollar!

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

BUFFALO FORGE COMPANY
166 Mortimer Street Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

For more facts circle 641 on Reply Card

NEW PRODUCTS

(Begins on page 200)

chambers are arranged so high velocity air blown into machine will circulate through and be discharged without entering internal vent passages leading to electric parts.

Baffles force incoming air to abruptly change its direction—90 deg or more — before reaching motor's electric parts. To further assure that moisture or dirt particles will drop out before reaching internal parts, air velocity into machine is less than 600 rpm. Filters are optional. A permanent wire-mesh type is used, when specified, and filter sections are readily accessible for inspection and maintenance. Space heaters, standard on machines for out-door service, are hairpin shaped, immersion-type units with integral terminal boxes arranged so that electrical connections inside machine are eliminated. Bulletin 05R8685 gives more details. Allis-Chalmers Mfg. Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 275-276.

58—CAPSULE GAGE for chemical, processing use

Lighter in weight and more compact than many comparable standard units, the No. 2594 Capsule Chemical Gage is designed with no gaskets or bolted joints. It is suggested for services requiring a short, compact pressure sensing element and for use under high temperature conditions when calibrated at operating temperature. It is reported especially applicable to chemical, petrochemical and processing industries for pressure control of hot liquids, such as asphalt, coal tars, by-product residues and other viscous fluids.

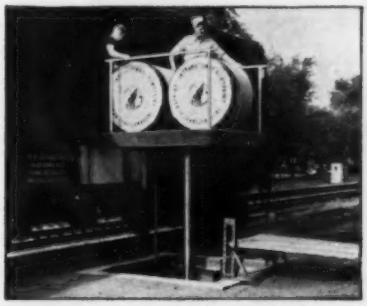
At present, the diaphragm of the gage is fabricated from 316 stainless steel, but it can be of any metal which can be formed and welded as a capsule. In operation, the gage indicates pressure by displacement of a filling liquid into the Bourdon tube. For temperatures between ambient and 200 F, the filling liquid is a solution of glycerine and water. Silicone oil is used for operating temperatures from 200 to 500 F. The unit can be filled without a screw hole in the housing or by capillary through the

INCREASED PRODUCTIVITY... HIGHER PROFITS THROUGH MINIMUM HANDLING!

by ANDREW T. BROWNE
Chief Engineer, Globe Hoist Company

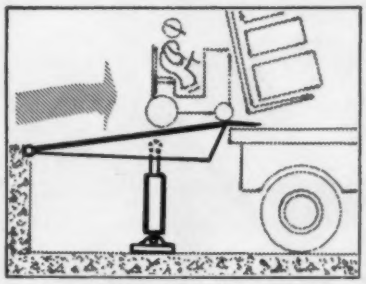
The nearer your materials-handling operation comes to being a continuous flow *without handling the material in transit,* the nearer you are to *keeping costs at an absolute minimum.*

A typical costly "bottleneck" in the continuity is the loading of trucks and freight cars. It takes extra men to waste your time and your money loading a truck without the help of a modern Globe Industrial Lift. Globe offers a selection of three different types of installations to load and unload your trucks or cars quickly, safely and at low cost.



GLOBE PLATFORM OiLIFTS

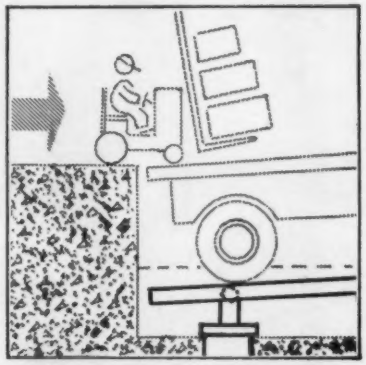
From the ground to the upper or lower level of freight car bed with the push of a button. Installed inside or out, the heavy non-skid platform recesses flush with surrounding floor or paved area when in "down" position. Wide range of platform sizes, high lifting capacities. Air-oil or electric pump unit power. Also used for truck loading.



GLOBE TRANS-O-MATIC RAMP

Here is one of the most popular and widely used means of bridging the gap between a dock and a truck.

A Globe Trans-O-Matic Ramp is a 20,000 lb. capacity "gangplank" from your loading dock to the truck or trailer bed. One end is hinged to the dock edge, a free-floating lip edge at the other end rides the truck bed. The hydraulic power jack, operated by either air-oil or electric pump unit, rests on a sturdy base plate. Easily and inexpensively installed. Built for hard use and trouble-free operation.



GLOBE TRUCK LEVELER

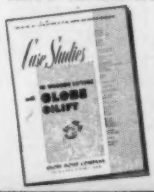
This is an easy and much used method of aligning truck-bed levels with the edge of your loading dock.

A Globe Truck Leveler is placed at the foot of a loading dock. This heavily reinforced hinged platform raises or lowers the rear of a truck or trailer to the point where the truck bed and dock level are aligned. Dual power cylinders are operated by either an air-oil or electric pump unit.

Industrial plants and warehouses and shippers throughout the world are using these Globe products to load their trucks, trailers, freight cars and even aircraft. They have more than paid for their installations with the money saved through the increased speed and efficiency of their loading operations. Some have taken advantage of Globe's Time Payment Plan, and are paying only a few pennies a day from the profits resulting from use of their Globe installations.

Globe manufactures the World's Most Complete line of Industrial Lifts and Automotive Hoists. Send for a Catalog describing the Globe Lift that will do the best job for you.

GLOBE®
OiLIFTS
PLANTS; DES MOINES–PHILADELPHIA–LONG BEACH, CAL.



GET YOUR FREE COPY TODAY!

GLOBE HOIST COMPANY PE—813-L
East Mermaid Lane at Queen Street
Philadelphia 18, Pennsylvania

Please send me detailed information on Globe Hoists for .....
(describe application intended)

NAME.....
COMPANY.....
ADDRESS.....
CITY..... STATE.....

For more facts circle 642 on Reply Card

Now, a solution to the never-ending industrial daylighting headache — costly replacement and constant maintenance. Plant and factory windows must withstand abuses of all types — hail, high winds, vandalism, fumes, vibrations, and even minor explosions.

Shatterproof, virtually unbreakable Corrulux Flat Glazing is the *logical, economical* solution to these abuses.

Soft, diffused light. Engineered colors. Standard industrial sizes. Factory-cut, pre-packaged. 25 or 50 to a carton.

Send now for specification sheet and sample.

NEW Corrulux PYRO PANE made with fire-retardant resin, recommended to meet restrictive fire codes.

Corrulux®

L·O·F GLASS FIBERS COMPANY,
DEPT. Q1, P. O. BOX 20026, HOUSTON 25, TEXAS

LOF GLASS FIBERS Corrulux®

For more facts circle 643 on Reply Card

NEW PRODUCTS

(Begins on page 200)

tube. It can be furnished with any of four standard dials from 3½ to 8½-in. diam. Helicoid Gage Div., American Chain & Cable Co., Inc.

59—MOVING KIT takes on loads up to 6000 lb

Packaged mobility for machinery, products and equipment up to 6000 lb is offered by the Multiton Junior. Designed to handle loads of every shape and dimension, this moving kit is self-contained in a steel case occupying only 13½ in. of storeroom shelf space. Similar in principle to company's heavy-duty roller skids, this kit is intended to provide even greater

flexibility in handling smaller loads. Its basic component is a set of four roller dollies, each with a load capacity of 1500 lb, measuring 12-by-5-by-3 in. The dollies are positioned under the load as needed, and have swivel heads which hold the load steady while the dolly can be turned 180 deg.

It is pointed out that equipment too unwieldy for standard moving equipment can be moved around corners and through narrow openings with this kit; also loads can be moved over rough, uneven surfaces. The kit, which sells for around $136, includes four roller dollies, four swivel heads, cast aluminum turning arm, two tandem connectors and the steel case. The tandem connectors are for joining two dollies for placement at strategic points under the load handled. Stokvis*Edera & Co., Inc.

60—SUMP PUMPS designed for easier servicing

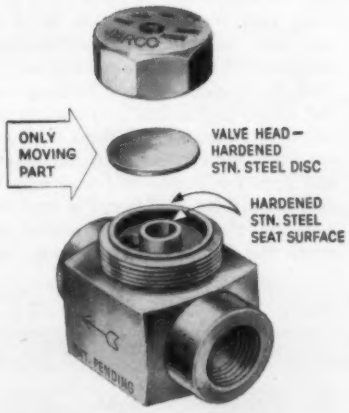
Re-designed non-clog sump pumps are announced for drainage, sewage disposal and other services. They come in 3- and 4-in. sizes, in capacities from 20 to 1100 gpm, with heads up to 160 ft. Principal gains attributed to the new design are less maintenance and easier servicing. The latter is achieved by a split motor stand, allowing access

End these steam trapping problems!

1. High maintenance cost
2. Too many sizes and pressure ratings
3. Steam blowing on light load
4. Limited installation space
5. Pressure variations
6. Corrosion
7. Air binding
8. Freezing

ACTUAL SIZE

HERE'S HOW...
with the versatile Sarco TD Thermodynamic Steam Trap



ONLY 3 PARTS
SIMPLE — TROUBLE-FREE

All parts machined from stainless steel bar stock. Only moving part — a solid hardened stainless steel disc — practically wear-proof.

No mechanism — the kinetic energy of steam closes the valve. No narrow channels to choke. No gaskets to leak.

1. **Practically eliminates maintenance** — as shown, left, the TD has only 3 simple, rugged parts — all stainless steel. No mechanism . . . to wear or malfunction. Highly resistant to superheat, water-hammer, corrosive condensate.

2. **One trap for all pressures** — 10 to 600 psi — for light or heavy loads. Self-adjusting — each size Sarco TD uses same large capacity seat for all pressures—without change or adjustment.

3. **Won't blow steam on light loads** — no prime to lose — no adjustments.

4. **Small as a tee fitting** — ½" size, for example, only 2¾" long, 1¼" wide, 2¼" high.

5. **Operates perfectly when pressure fluctuates** — absolutely no effect from 600 to 10 psi! No water seal to evaporate. No adjustments.

6. **Unaffected by corrosive condensate** — made of stainless steel throughout.

7. **No air-binding** — discharges at steam temperature and vents air and air-steam mixtures at start-up and during operation.

8. **Freeze-proof** — self-draining when installed with outlet down.

60-DAY TRIAL CONVINCES

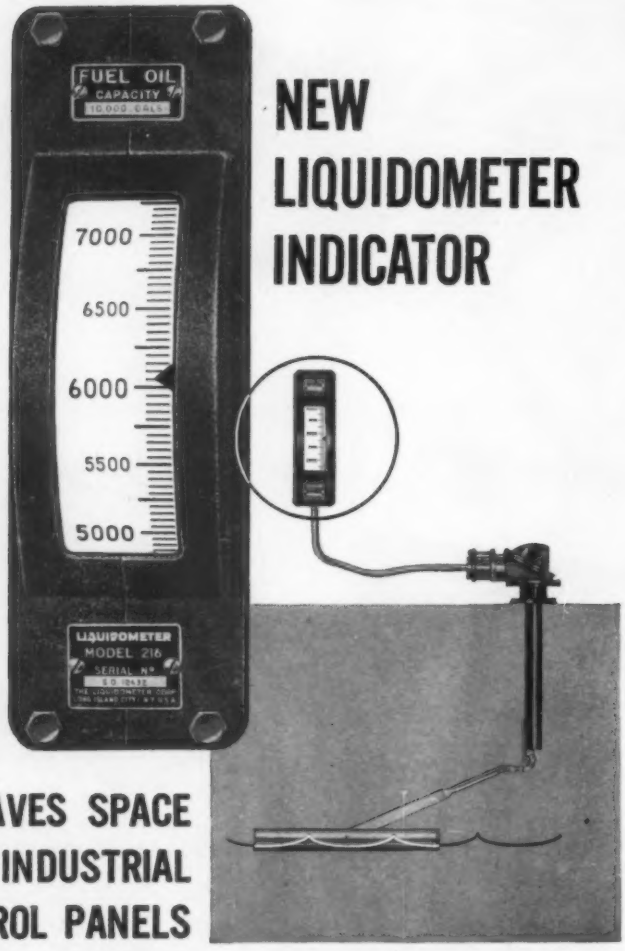
We will gladly send you a Sarco TD steam trap and strainer for 60-day trial. No cost or obligation. You buy *only* if completely satisfied. Advise size — ⅜, ½, ¾ or 1" — and application. Sarco Company, Inc., 635 Madison Ave., New York 22, N.Y.

2217-B

SARCO Thermo-Dynamic TRADE MARK **STEAM TRAP**

THE MODERN STEAM TRAP — THAT CAN DO MORE THINGS BETTER!

For more facts circle 644 on Reply Card



NEW LIQUIDOMETER INDICATOR

SAVES SPACE ON INDUSTRIAL CONTROL PANELS

Twenty-inch dial in 3x10¼" case permits close readings

The new Liquidometer Model 216 Indicator gives the plant engineer a reliable, automatic reading of storage tank contents. Available in either vertical or horizontal design, the compact and highly readable Model 216 Indicator makes possible multiple installations on crowded control panels.

Teamed with Liquidometer's time-tested hydraulic transmission gaging system, the new indicator provides instantaneous remote indication of liquid levels—automatically. No outside power source is required. Virtually any liquid may be measured, and the indicator can be located up to 250 feet from the tank.

Engineered for dependability, the Liquidometer gaging systems highlight these design features:

- Maintenance free
- Integral temperature compensation
- Ease of installation—requires only one 2" diameter tank opening
- Safety—all gages Underwriters approved for hazardous liquids

Indicator, write Dept. B.
For further details on the new Model 216

THE LIQUIDOMETER CORP.
SKILLMAN AVENUE AT 36th STREET
LONG ISLAND CITY 1, NEW YORK

For more facts circle 645 on Reply Card

NEW PRODUCTS

(Begins on page 200)

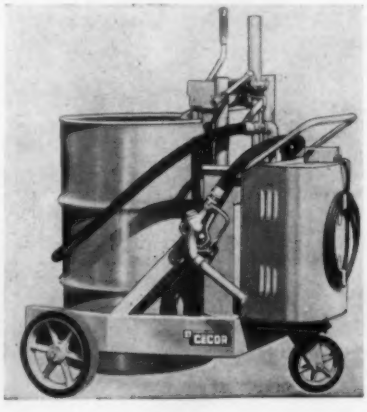
to motor, pump shaft and bearings. After removing only four bolts, motor can be lifted off the pump without disturbing piping. Self-lubricated bearings are used. Both the double sealed ball thrust bearings above the floor plate and the intermediate sleeve bearings used on the shaft when the sump depth exceeds 4½ ft will operate for the life of the pump without outside lubrication, it is stated. The pumps are equipped with grease packed stuffing boxes. Economy Pump Div., C. H. Wheeler Mfg. Co.

61—DUST COLLECTOR has large capacity storage bin

Dustkop Model 520-D is 10-in. higher than company's standard Model 520, has identical air handling characteristics and base dimensions, but a dust storage bin that is twice as large. Company recommends it for use in metalworking shops or in any other shop operation where dust volume is unusually large. Even where the problem is ordinary, the increased capacity of the 520-D will reduce the need for emptying bin. Base is 18 by 23 in. and height 34 in. Aget Mfg. Co.

62—DRUM DISPENSER affords easy transportation

Where lubricating oil, coolant, solvent, paint or chemicals are pumped directly from drums the CeCor Model 76E provides easy transporfation to point or use and direct-from-drum electrical pumping. A drum, weighing up to 1000 lb, is clamped in a locking vise and raised hydraulically in upright position for carrying. No load is placed on the operator, says manufacturer, and open-top drums of liquid may be carried without spillage. The unit has a ½-hp electric motor mounted beneath the handle, 15-gpm pump, two



GET ALL THE SURPRISING FACTS ABOUT ALCOA ALUMINUM ELECTRICAL RIGID CONDUIT

Material price comparisons, plus the increasing cost of installation, have focused attention on the many advantages of Alcoa® Aluminum Electrical Rigid Conduit and the potential savings it provides. Such as:

—No maintenance painting; no staining

—Weighs two-thirds less than steel

—Easier to cut, bend, thread, install

—Nonsparking

—Up to 20% less voltage drop

They all boil down to new lows in the combined cost of materials and installation on inherently corrosion-resistant conduit installations. In the larger sizes, four inch for example, aluminum installed costs less than steel. In smaller sizes, rustproof, always-good-looking aluminum conduit costs only slightly more.

You can get all of these facts from your nearby Alcoa sales office or by writing for a copy of our rigid conduit booklet. We'd also like you to have a one-foot sample of aluminum conduit for inspection and testing. Just complete and mail this coupon.

ALCOA ALUMINUM CONDUIT
ALUMINUM COMPANY OF AMERICA

Underwriters' Laboratories, Inc. INSPECTED
RIGID CONDUIT
ISSUE MC-36

Your Guide to the Best in Aluminum Value

NEW! "ALCOA THEATRE" Exciting Adventure Alternate Monday Evenings

Aluminum Company of America
2330-K Alcoa Building
Pittsburgh 19, Pa.

Please send literature on *Alcoa Aluminum Electrical Rigid Conduit* and a one-foot sample.

Name_____

Title_____

Company_____

Address_____

City and State_____

For more facts circle 646 on Reply Card

Drives like a nail, holds like an anchor
Shure-Set®

Maintenance jobs are easy with SHURE-SET—the hammer-in tool that sinks fasteners into mortar and concrete, as if by magic! Use no cartridge.

Eliminates drilling and plugging; no wires, no hose, no equipment to drag; completely portable . . . carry tool, hammer, and all the drive pins and studs you need, in convenient kit.

For renovating, redecorating, anchoring equipment, fastening partition plates and EVERY fastening job involving brick, concrete, masonry or light steel, SHURE-SET makes the tough jobs easy. Do in 30 seconds what once took up to 15 minutes!

SHURE-SET is baby brother to RAMSET®, the powder-actuated fastening method. Use SHURE-SET for light-duty, RAMSET for heavy-duty jobs. Catalogs are now ready. Write for literature on *both tools* today.

Shure-Set
Trademark
HAMMER-IN FASTENING TOOLS
PATENTS PENDING
BY THE MAKERS OF **Ramset®** PRODUCTS

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION

12133-J BEREA ROAD • CLEVELAND 11, OHIO

For more facts circle 647 on Reply Card

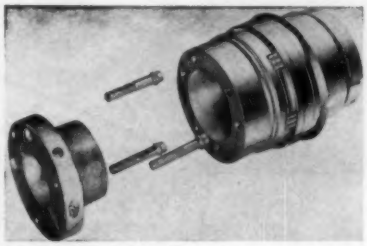
NEW PRODUCTS

(Begins on page 200)

heavy duty wheels and one caster, Neoprene dispensing and barrel hoses. The clamp is adjustable for various drums and chime thicknesses. Coolant Equipment Corp.

63—FLEXIBLE COUPLINGS for taper bushings

This line of flexible couplings, taper-bored for use with QD taper bushings, comes in six sizes ranging from 22 to 150 hp at 1750 rpm. Stock bushing

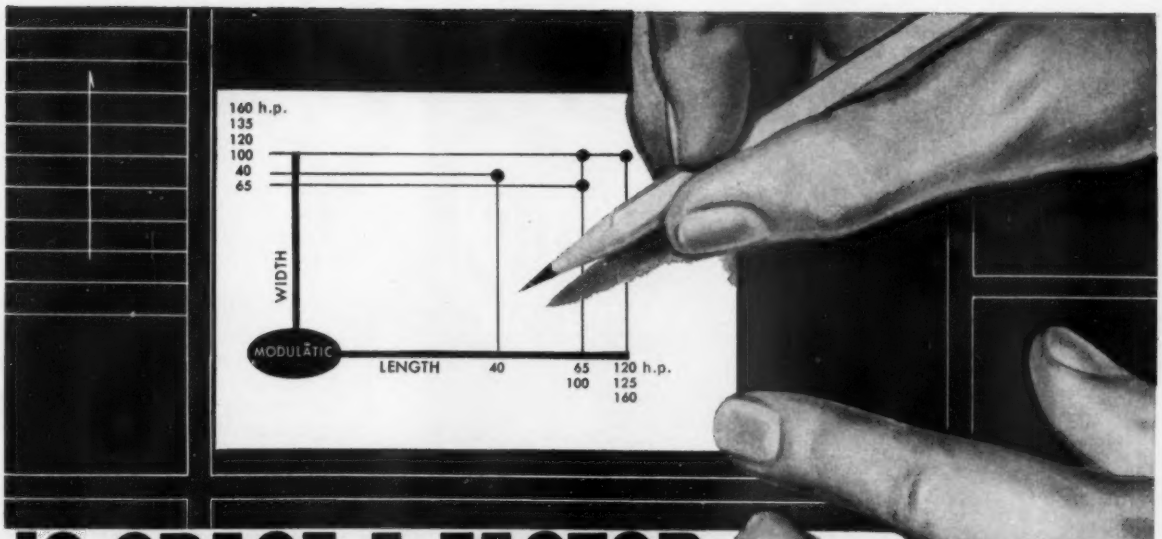


bore sizes begin at ½ and progress to 3½ in. by sixteenths-of-an-inch. The couplings are designed to accommodate standard QD bushings. Advantages reported include: reduction of normal stock requirements of coupling bodies; immediate availability of a wide range of shaft sizes from this reduced stock by means of a convenient complimentary stock of QD bushings; and a coupling-bushing combination that affords easy fastening to the shaft with the firmness of a shrunk-on fit. Lovejoy Flexible Coupling Co.

64—VOLUME CONTROL for air conditioning system

The R-316 Air Flow Controller is for mixing units used on high velocity, high pressure, double duct air conditioning systems. It is designed to provide constant volume air distribution through every unit of a system, maintaining a constant flow pattern within each conditioned space—regardless of the number of mixing units, length of duct runs or differences in pressure between hot and cold ducts. Since the R-316 is pre-set for desired air delivery rate, it eliminates manual balancing. Constant volume air delivery also eliminates variation in sound levels, it is noted.

As the power source for this device is taken from the filtered and dehumidified control air supply system, problems arising from residual dirt in the duct distribution system and dirt contaminated duct air are eliminated. By using control system air power, static pressure of the supply can be



IS SPACE A FACTOR IN YOUR BOILER NEEDS ?

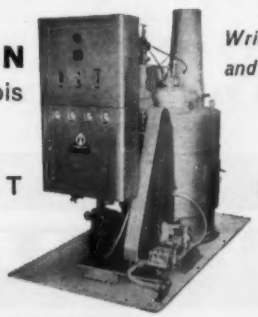
Here's a quick easy way for you to make your own preliminary plans for maximum steam capacity in minimum space.

FREE 1/4 INCH SCALE TEMPLATE OF COMPLETE VAPOR MODULATIC WATER TUBE BOILER LINE MAKES BOILER NEED PLANNING SIMPLE

Set the template on your floor plan and select the size boiler you need — experiment with locations. Modulatic needs no enclosures, no chimney, no foundation. Put it where you want to use steam. On the roof, on a balcony, in an aisleway, hang it from the ceiling or put it in the basement. Proved by 25 years in America's toughest boiler rooms! 10 horsepower to 160 horsepower. From 5 pounds to 300 pounds pressure (higher when required).

VAPOR HEATING CORPORATION
80 East Jackson Boulevard · Chicago 4, Illinois

Write for your free template and Bulletin 586—a postcard will do.



THE WORLD'S MOST COMPACT POWER PACKAGE

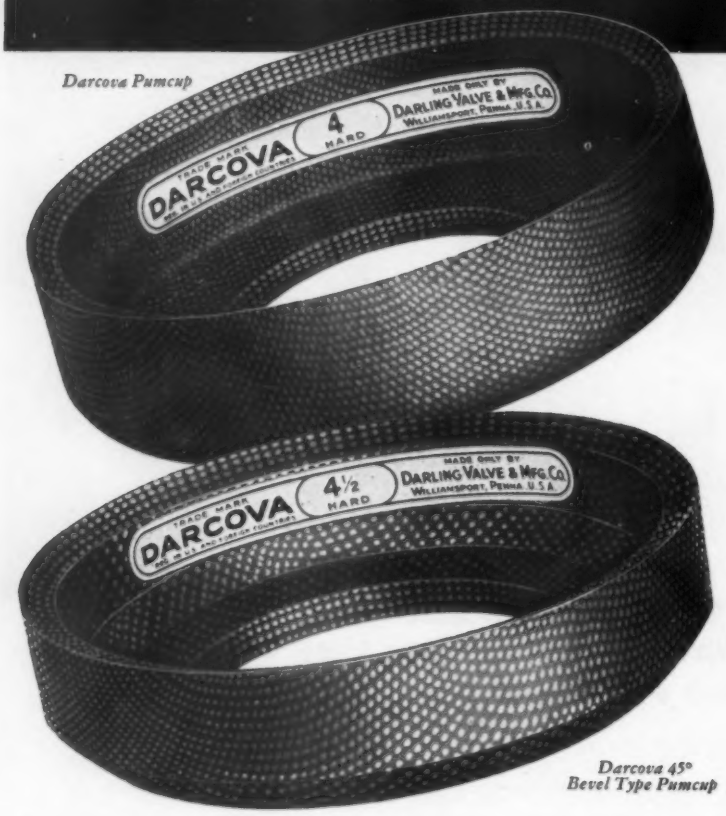
For more facts circle 648 on Reply Card

DARCOVA PUMCUPS

now available with

100% NYLON COMPOSITION

for HYDRAULIC CONTROLS, AIR CYLINDERS, RECIPROCATING PUMPS



Darcova Pumcup

Darcova 45° Bevel Type Pumcup

DARLING Pumcups—long noted for unequalled efficiency and life in all kinds of cylinders—are now greatly exceeding their own performance records! The new 100% Nylon Composition, available *only* in Darcova Pumcups, does it!

Nylon Pumcups are made in sizes, types and textures exactly right for your particular equipment—ready *now* to give you unprecedented piston packing performance!

Write for helpful data Bulletin No. 5503.

DARLING VALVE & MANUFACTURING CO.
Williamsport 14, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
TRADE MARK
PUMCUPS

For more facts circle 649 on Reply Card

NEW PRODUCTS

(Begins on page 200)

maintained at minimum pressure required for air distribution without necessity of maintaining a higher pressure for instrument operation. Full details are in Bulletin M-104-6. Johnson Service Co.

Use the Reader Service Cards provided on pages 275-276 to ask for more information on these products. Circle item numbers of products in which you are interested.

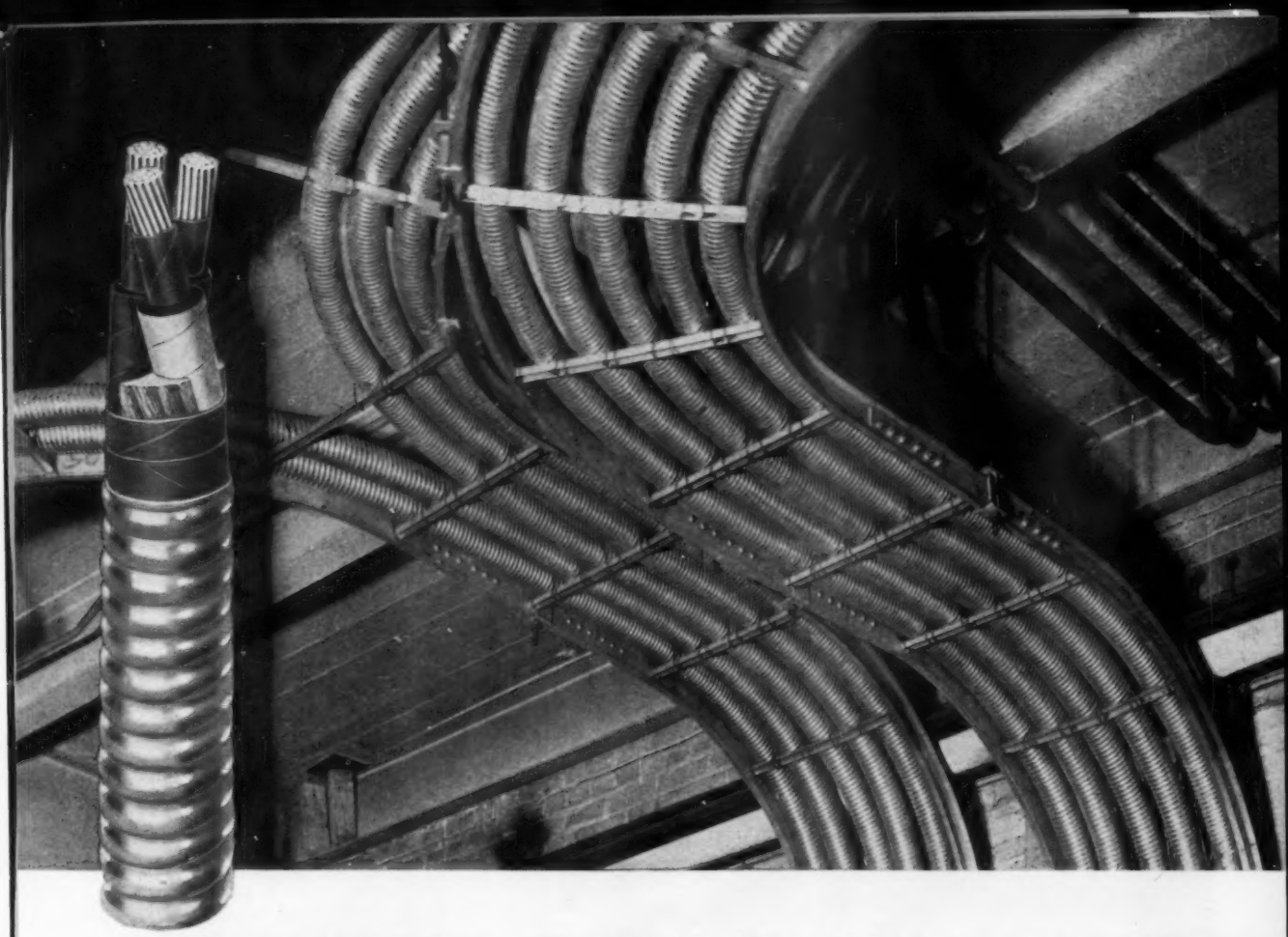
65—PUSHBUTTON NAILER does the job faster

This new OHL Spotnailer operates as fast as one can thumb a button, says manufacturer. The picture, shows its use in fabricating roof trusses. When the change was made from manual nailing to Spotnailing, the crew's pro-

duction reportedly jumped from 30 to 75 a day. This new pushbutton nailer is claimed to drive 1½ fasteners (the equivalent of a 6d nail) into hardest woods. The gun is pneumatic, no piston springs being required. The Spotnailer is said to drive a fastener without recoil or shock. The operator uses one hand to slide it from place to place, and thumbs the button as he goes along, usually driving three fasteners a second. The tool requires no more than 100 psi pressure, it is pointed out, and it offers economy of air used. Spotnails, Inc.

66—DUST CONTROL UNIT is economical, efficient

This low cost dust filter unit is announced as combining features of a cyclonic dust separator and high efficiency (claimed up to 99.99 per cent) of a dust filter. Although it employs high velocity reverse air cleaning, dust is deposited on the outside of the filter sleeves. An inner liner surrounds



cut cable installation costs the modern way...

with Loxarmor — the modern armored cable whose strength and flexibility make it a cost-saving alternative to conduit-enclosed cable. Rubber-insulated Loxarmor with its interlocking S-shaped armor is ideal for either power or control circuits.

Lower installation costs — Loxarmor eliminates conduit and related installation costs such as making bends and using pull boxes... especially economical to use in cramped quarters.

Easier to add or re-route circuits — Usually trained in trays or racks, Loxarmor cables are easily re-routed and are 100% salvageable. New cables are quickly added to existing trays.

Use indoors or outdoors — Loxarmor can be used in wet or dry locations. Indoors or outdoors, Loxarmor cables are readily accessible for easy inspection and maintenance.

Less space required — Multiple Loxarmor circuits require only a little more than half the space needed for equivalent conduit circuits.

Loxarmor can be supplied over any standard Okonite insulation—rubber, varnished cambric or plastic—depending upon your installation conditions and voltage requirements. It is available with galvanized or stainless steel, aluminum or bronze armor. Either copper or aluminum conductors are of course available.

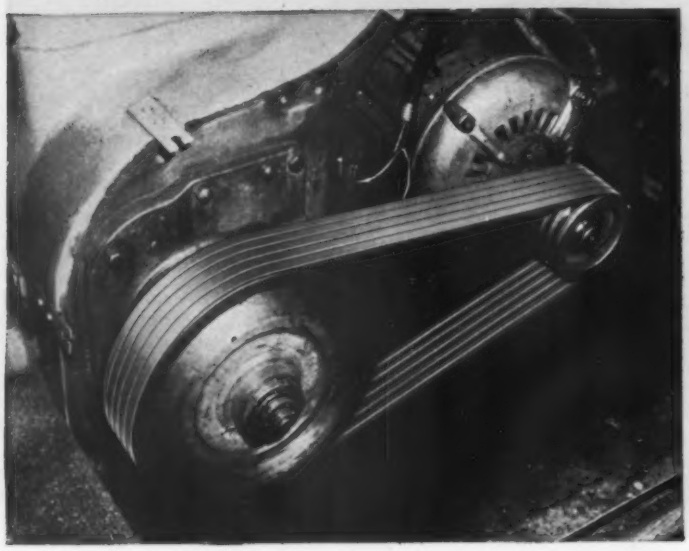
For dimensional data on Okonex rubber insulation applied by the strip-insulating process write for Bulletin PE-1090. Complete splicing and terminating drawings and instructions for Loxarmor are also included. The Okonite Company, Passaic, N. J.

where there's electrical power... there's **OKONITE CABLE**

4740

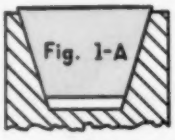
For more facts circle 650 on Reply Card

CONCAVE SIDES make V-belts last longer



***See for yourself* why the concave sides (Fig. 1) of a Gates V-Belt greatly lengthen its life. Just do this:**

Bend a Gates belt and feel the sides. Note how these precisely engineered concave sides *fill out* on the bend and *become straight*. Thus a Gates belt grips the sheave groove evenly (Fig. 1-A) and wear is distributed uniformly across each side of the belt. That means longer belt life; lower costs.



Make the same test with a straight-sided belt (Fig. 2) and see what happens. The sides bulge out on the bend (Fig. 2-A) concentrating the wear at points shown by arrows.

For longer belt life...lower belt costs, specify the V-belt with Concave sides—Gates Vulco Rope...readily available from nearby distributor stocks.

TPA 151

World's Largest Maker of V-Belts

The Gates Rubber Company

DENVER, COLORADO

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and in 70 other countries throughout the world.

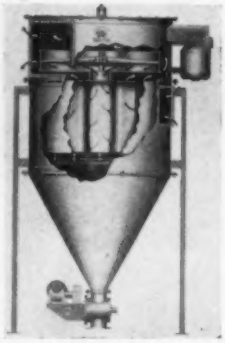
Gates VULCO ROPE Drives

For more facts circle 651 on Reply Card

NEW PRODUCTS

(Begins on page 200)

the sleeves and the dust laden air travels in a cyclonic path, separating the heavy dust particles before the air carrying the "fines" enters the filter chamber. The unit has many applications, manufacturer notes, and is especially suited for separating product



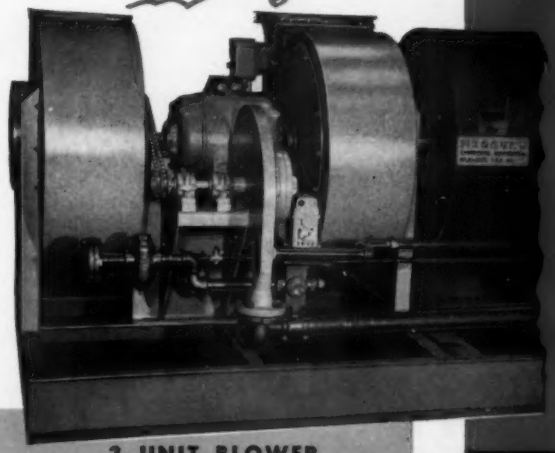
from airstream in pneumatic conveying systems.

The unit is designed for automatic continuous operation. Product discharge is handled automatically and continuously by means of a rotary valve. Moving parts are located on the clean air side to assure long life for the mechanical assembly of the filter. Felted filter media is used for the filter sleeves. Bulletin 560 gives details. The Day Co.

67—APPRAISAL DEVICE forecasts pay-off period

The Appraiser is a 6-in. diam plastic device designed to help you decide quickly whether a piece of new equipment will pay for itself or in a reasonable length of time. It is based on a tested formula, and gives the answer with a quick setting of the dials. An example of its use, cited by company, concerns purchase of a new duplicator which would cost around $700 but save 10 cents worth of preparation

WHAT Bayley MEANS by ENGINEERED Air-Handling Equipment

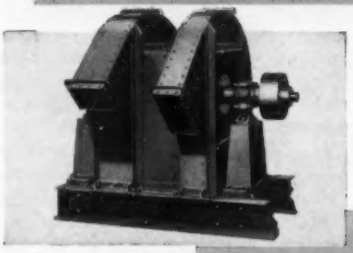


3 UNIT BLOWER

Consisting of One Unit for High Temperature, One Unit for Low Pressure, and a Third Unit For Secondary Combustion Air.

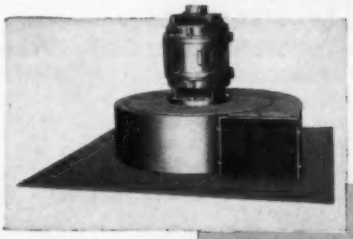
Complete unit built by Bayley for Mercury Engineering Corporation, Milwaukee, to handle three different pressures, volumes and temperatures of air for aniline rotary press.

A UNIT FAN DESIGNED FOR SINGLE, DOUBLE, AND NOW TRIPLE APPLICATIONS!



DOUBLE BLOWER

1 Unit for High Pressure — 1 for Low Pressure.



SINGLE BLOWER

Designed for Dust Collection.

Another advance in Air-Handling engineering and technique — a Triple Unit Blower designed and produced by BAYLEY . . . further evidence of the ability of this organization to successfully meet the specialized air-handling requirements of a wide range of industrial needs. Our engineering staff is always ready to consult with you regarding your problems.

Bayley

BLOWER COMPANY

1825 SOUTH 66TH STREET
MILWAUKEE 14, WISCONSIN

ENGINEERED Air-Handling Equipment

For more facts circle 652 on Reply Card

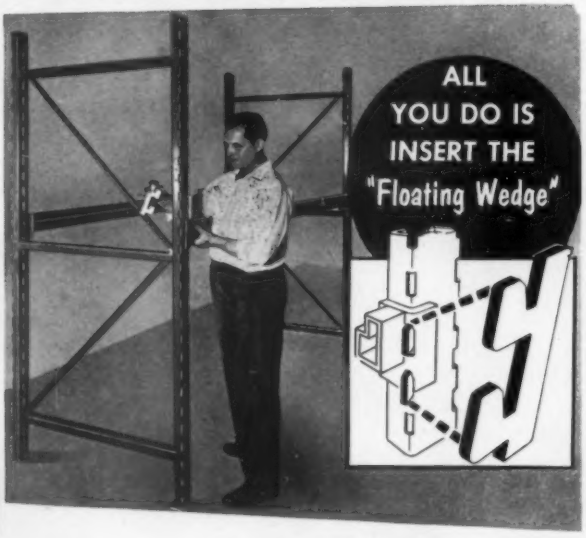
Sturdi-Bilt ADJUSTABLE STORAGE RACKS

DELIVERED TO YOU

97% ASSEMBLED

ONE PIECE WELDED END FRAMES — No flimsy cross bracing

ONE PIECE WELDED SAFETY SUPPORT BARS — Safe loading up to 8,000 lbs. per pair



- NO BOLTS OR NUTS!
- NO HAND TOOLS!
- NO ERECTION WELDING!
- NO "SKILL" REQUIRED!
- NO SWAY Or Cross Bracing!
- QUICKLY ERECTED!
- INSTANTLY REARRANGED!
- SIMPLY ADJUSTED!
- EASILY RELOCATED!
- ALL PARTS 100% REUSABLE!

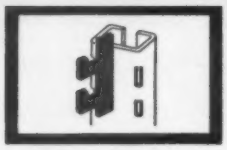
Plus "BUILT-IN" SAFETY!

Sturdi-Bilt's prefabricated factory welded components let you set up your storage with tested, predetermined, controlled load factors. The human element is eliminated — there is no risk of labor variations during field assembly. Write for Sturdi-Bilt's special "Load Chart" and complete details.

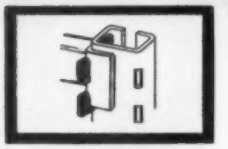
*U.S. Patent No. 2760650 Other patents pending.

Only 3 BASIC PARTS with patented "Float Wedge Construction" mean FASTEST INSTALLATION - EASIEST ADJUSTABILITY

1. Simply insert Sturdi-Bilt Wedge Lock . . .



2. . . . into the slots in the factory prefabricated upright frame . . .



3. . . . and lock to the horizontal safety support bars.

Space your openings anywhere on 3" centers - simple to place - quickly respaced.

ONE BASIC STRUCTURE SERVES EVERY STORAGE NEED FOR . . .

• Pallets • Skids • Bulk • Dies • Coils • Barrels • Reels

Sturdi-Bilt

WRITE FOR DETAILS

Sturdi-Bilt Engineering Company

2501 Peterson Ave. Chicago 45, Ill. Dept PE-107

For more facts circle 653 on Reply Card

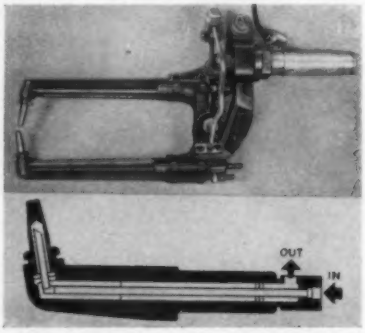
NEW PRODUCTS

(Begins on page 200)

time on each shop order. The Appraisor shows that a minimum volume of 600 orders per month would be required to justify buying the duplicator. The Appraisor costs less than $8.00. Van D. Mark.

68—WELDING GUNS are cooler operating

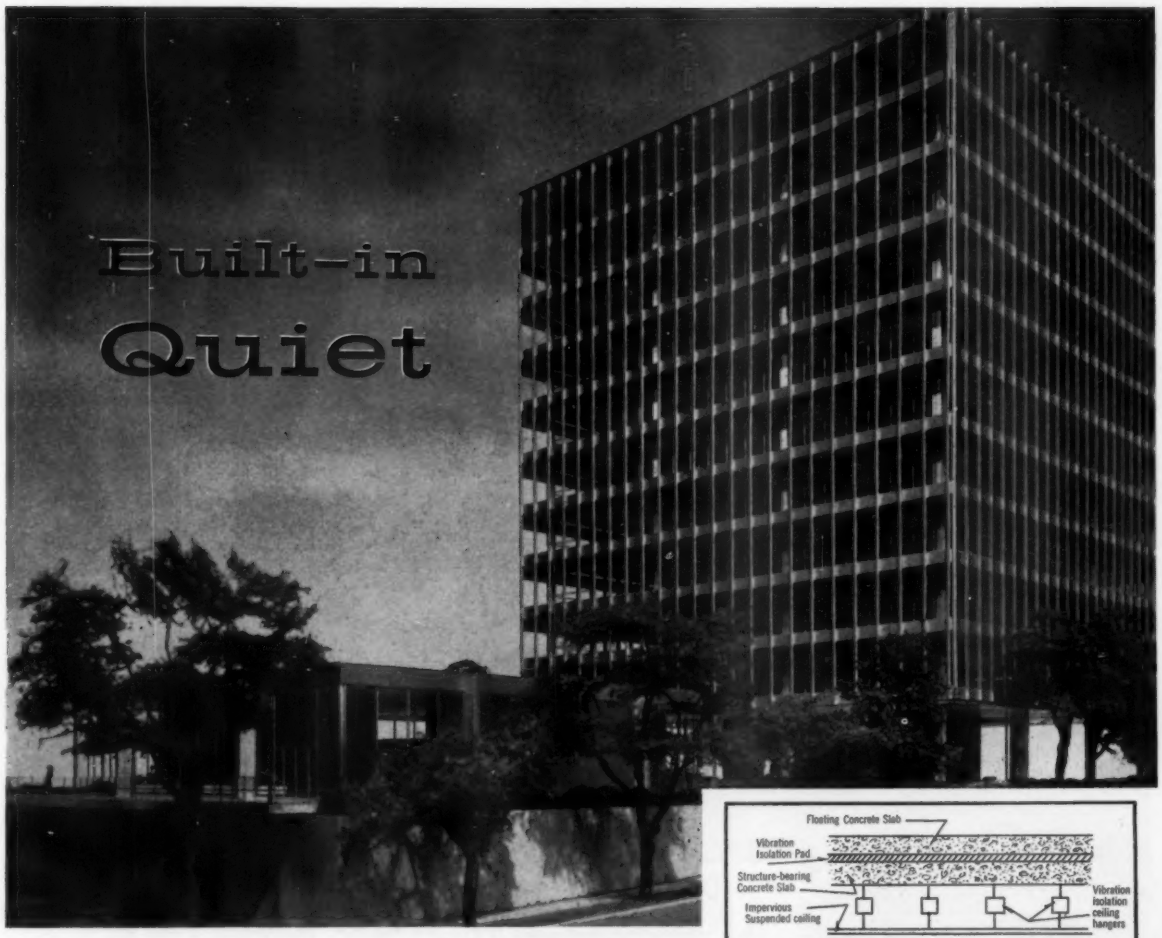
Operation so cool you can hold your hand on the jaw extension, right below the point, is claimed for this line of portable welding guns. Cooling is accomplished by elimination of the usual integral cast water line. Instead, incoming water reaches the

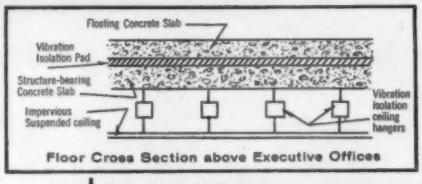


welding point through a tube that is insulated almost its entire length from the metal of the extension jaw by the return water jacket. This jacket has capacity five times that of the in-flow tube and heat transfer to the in-flow tube is much less than with small diameter cast-in return water tubes, it is noted. Another feature of the guns is the use of a contact fulcrum pin in place of the conventional shunt that tends to overheat causing early failure. A built-in guide for the moving jaw serves to prevent wear on fulcrum pin if gun is used in cocked position. Allied Welder Corp.

69—STEAM HOSE, wire braided, for 200-psi use

Gibraltar Steam Hose is suggested for saturated steam pressures up to 200 psi for handling super-heater steam at temperatures to 385 F. This hose is constructed with heat-resisting rubber tube and features two braided plies of high tensile reinforcing wire. These reinforced wires guard against hose rupture or bursting during operation. A heat-, oil- and abrasion-resisting Neoprene cover is inseparably bonded to the wire carcass by a ply of high-tensile, heat-resisting cord yarn. For steam handling and steam jenny service, this hose is available in sizes





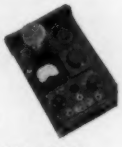
Floor Cross Section above Executive Offices

Noise control is an important goal of modern architectural design. The main objectives — adequate sound isolation between rooms and working areas and the exclusion of unwanted outside noises.

The Warren Petroleum Building at Tulsa, Oklahoma is an example of the acoustical environment that can be achieved through use of modern engineering techniques. The building, designed by Skidmore, Owings, and Merrill, features comfortable working surroundings throughout. Controlled multiple-floor and -wall construction and vibration isolation give 50-70 db noise reduction between the air-conditioning plant on the uppermost floor and the executive offices immediately below. The acoustic effect obtained can best be described as theater-like, in keeping with the decor of executive offices (sound levels are actually below those found in well-designed theaters).

The consulting firm of Bolt Beranek and Newman Inc., long-time user of General Radio sound and vibration-measuring equipment, is responsible for the acoustical design recommendations for this building. Knowledge gained through experience, including technical information obtained from measurements in the field and in experimental laboratories, provides the background needed to assure the desired degree of sound isolation.

Improved acoustics in modern building design has been made possible by the advent of accurate, easily used sound-measuring instruments of the type manufactured by the General Radio Company. The sequence for progress is, today as always . . . Measurement . . . Analysis . . . Improvement.



Type 1551-A
Sound-Level Meter, $385

Type 1555-A
Sound-Survey Meter, $150

Type 1550-A
Octave-Band Noise Analyzer, $535

Type 1556-A
Impact-Noise Analyzer, $210

Type 761-A
Vibration Meter, $510

and Type 762-B Vibration Analyzer, $585

All G-R Products are now covered by a

2-Year Warranty

Complete Instrumentation for Sound Measurement and Analysis

GENERAL RADIO Company

275 Massachusetts Avenue, Cambridge 39, Mass., U.S.A.

Broad Avenue at Linden, Ridgefield, N. J. **NEW YORK AREA** 1000 N. Seward St. **LOS ANGELES 38**

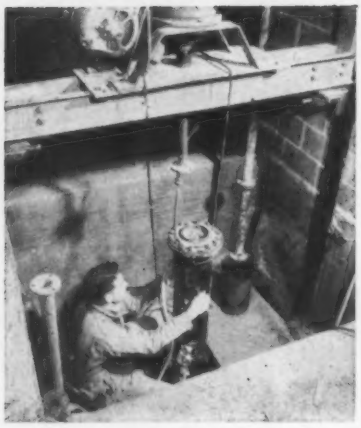
8055 13th St., Silver Spring, Md. **WASHINGTON, D. C.** 1150 York Road, Abington, Pa. **PHILADELPHIA**

1182 Los Altos Ave., Los Altos, Calif. **SAN FRANCISCO** 6605 W. North Ave., Oak Park, Ill. **CHICAGO**

In **CANADA:** 99 Floral Parkway, **TORONTO 15**

For more facts circle 654 on Reply Card

CUT ELEVATOR COSTS AND MAINTENANCE



A powerful *hydraulic jack moves and supports the modern Rotary Oildraulic Elevator from below. Here, jack casing is being lowered into hole drilled in center of elevator shaftway pit.*

Polished steel plunger *moves up and down in casing. Elevator car is bolted to top of plunger which rises as oil is pumped into the casing. All weight rests on pit foundation, not on building walls.*

No expensive penthouse *is required to house this efficient, compact power unit. There is no overhead machinery, no cables to wear out and be replaced. All elevator adjustments are made right here.*

EASILY INSTALLED HYDRAULIC ELEVATOR

has many advantages for freight service

- Reduced building costs
- Consistently dependable operation
- Rugged construction to withstand shocks and jolts of heavy-duty freight service
- No cables to wear out
- Capacities from 1000 to 100,000 lbs.
- Nationwide service facilities

Mail now for more information

Rotary®
OILDRAULIC® ELEVATORS
Rotary Lift Company
Division of the Dover Corporation
Memphis, Tenn.—Chatham, Ontario

ROTARY LIFT CO.
1023 Kentucky, Memphis 2, Tenn.

Send complete information on ( ) freight ( ) passenger elevators to:

*Name*_____

*Address*_____

For more facts circle 655 on Reply Card

NEW PRODUCTS

(Begins on page 200)

from ½ to 2½ in. ID, these sizes weighing from 62 to 230 lb per 100 ft. Hamilton Rubber Mfg. Corp., Div., Acme-Hamilton Mfg. Corp.

70—PROGRAMMER for electrostatic precipitators

For automatically adjusting electrostatic precipitator voltage to permit maximum cleaning of smokestack discharges, this automatic programmer has broad applications in industries where stack discharges present a soot and dust problem. It has no moving parts and can be applied to existing precipitators or new installations. Built-in flexibility of this programmer makes it adaptable to a variety of precipitator control circuits, says company; it is designed for simplified installation and reduced maintenance, and use of potted transistors, rectifiers and other static components contributes to longer service life. It has a spark frequency adjustment to preset the allowable number of sparks per minute; an incremental voltage adjustment to regulate magnitude of voltage increase or decrease in a given period, and a maximum current limiting adjustment. General Electric Co.

71—TRAMRAIL CARRIER with dumping hoist

This cab-controlled twin-hook hoist carrier is provided with an auxiliary hoist for dumping. Of weatherproof construction for outdoor service, the unit picks up tote boxes of materials,

hauls them and empties them by tipping. While the carrier is especially designed for handling slag in a steel mill, it is reported suitable for castings, bolts, nuts and other machined parts, sand and various bulk materials. Hoisting and travel motions are controlled by the cab operator. The main hoist alone raises or lowers a tote box in upright position. Hoist speed is 35 fpm; travel speed is 250 fpm. Var-

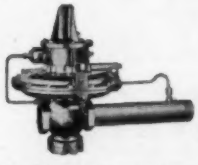
METER YOUR INDIVIDUAL FURNACES TO CONTROL QUALITY AND COSTS

When you process with gas, metered records of consumption will quickly show up combustion deficiencies that affect the quality of your end product. Meters standing guard at every burner will discourage wasteful fuel practices. And only from metered records of the fuel used can you arrive at accurate costs.

Why don't you investigate the advantages of metering individual furnaces, kilns or ovens? Learn the economies of using Rockwell meters as production tools. *Write us or use the handy coupon.*

Good Combustion Requires Close Regulation

For Low Pressure Burners



For High Pressure Burners

Good combustion control is the key to good process control. Rockwell makes a complete line of pressure regulators for all types of industrial burners. Use the coupon for full details.

ROCKWELL
GAS METERS and REGULATORS

CLIP COUPON—MAIL TODAY

Rockwell Manufacturing Company
Pittsburgh 8, Pa.

Gentlemen:

I am interested in your meters for measuring gas to individual furnaces ☐. Your pressure regulators for burner control ☐. Please send literature ☐. Have representative call ☐.

Your Name_____

Company_____

Street_____

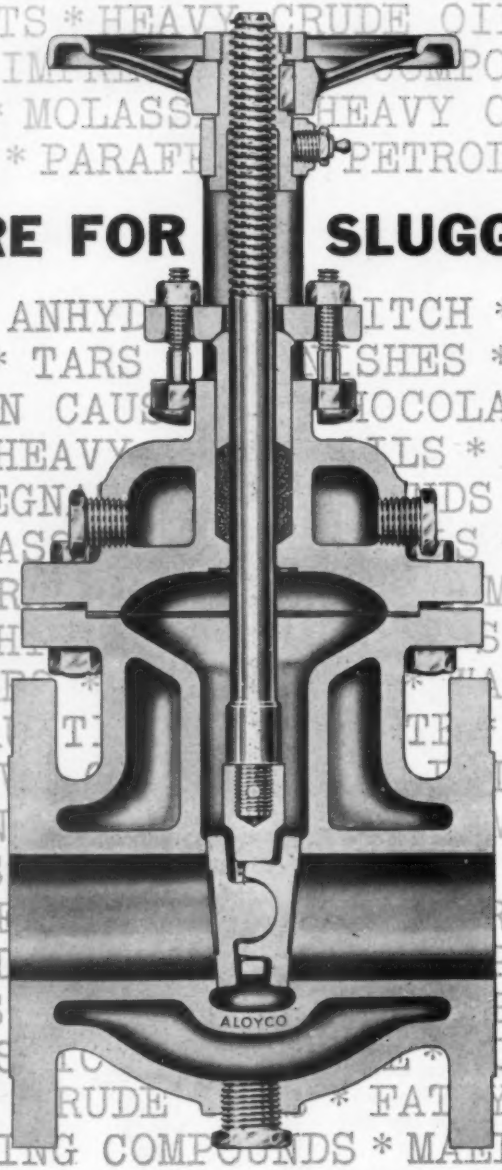
City_____ Zone_____ State_____

For more facts circle 656 on Reply Card

ASPHALT * MOLTEN CAUSTIC * CHOCOLATE * COAL TAR PRODUCTS * HEAVY CRUDE OILS * FATTY ACIDS * GUMS * IMPREGNATING COMPOUNDS * MAELIC ANHYDRIDE * MOLASSES * HEAVY OILS * HYDROGENATED OILS * PARAFFIN * PETROLEUM RESIDUES

SURE CURE FOR SLUGGISH FLUIDS

* PHTHALIC ANHYDRIDE * PITCH * SOAPS * MOLTEN SULFUR * TARS * VARNISHES * WAXES * ASPHALT * MOLTEN CAUSTIC * CHOCOLATE * COAL TAR PRODUCTS * HEAVY CRUDE OILS * FATTY ACIDS * GUMS * IMPREGNATING COMPOUNDS * MAELIC ANHYDRIDE * MOLASSES * HYDROGENATED OILS * PARAFFIN * PETROLEUM RESIDUES * PHTHALIC ANHYDRIDE * PITCH * SOAPS * MOLTEN SULFUR * TARS * VARNISHES * WAXES * ASPHALT * MOLTEN CAUSTIC * CHOCOLATE * COAL TAR PRODUCTS * HEAVY CRUDE OILS * FATTY ACIDS * GUMS * IMPREGNATING COMPOUNDS * MAELIC ANHYDRIDE * MOLASSES * HYDROGENATED OILS * PARAFFIN * PETROLEUM RESIDUES * PHTHALIC ANHYDRIDE * PITCH * SOAPS * MOLTEN SULFUR * TARS * VARNISHES * WAXES * ASPHALT * MOLTEN CAUSTIC * CHOCOLATE * COAL TAR PRODUCTS * HEAVY CRUDE OILS * FATTY ACIDS * GUMS * IMPREGNATING COMPOUNDS * MAELIC ANHYDRIDE



COMPLETELY JACKETED ALOYCO VALVES

Aloyco Jacketed Valves are the surest way to keep slow moving corrosives flowing because they maintain higher temperatures than valves heated by other methods.

Jacketed valves are made in a variety of sizes and pressures and are furnished with convenient inlet and outlet holes for heating with steam or other media. They are available in 18 8S, 18 8SMO, Aloyco 20 and other analyses to specification.

The broad Aloyco Valve line includes Jacketed Gate (above) Globe and Check Valves, the first Jacketed Valves ever integrally cast in high alloys. One more indication of Aloyco's leadership in pattern making, foundry techniques and engineering skills. Long experience in these areas has made Aloyco the world's foremost specialist in Stainless Steel Valves.

Ask Aloyco's Corrosion Engineering Service to work with you on your valve problems. Alloy Steel Products Company, 1308 West Elizabeth Avenue, Linden, New Jersey. 7.12

ALLOY STEEL PRODUCTS COMPANY

For more facts circle 657 on Reply Card

NEW PRODUCTS

(Begins on page 200)

iable speed controllers are provided. Capacity is 12,000 lb, 6000 lb per hook. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

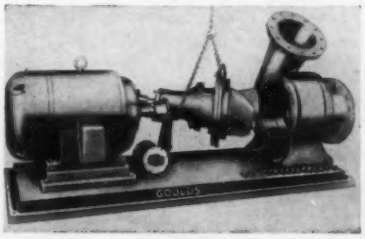
72—MOTOR STARTERS are compact and accessible

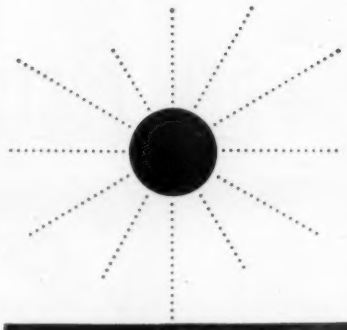
This line of 2300- to 4160-v starters (Type H) is announced for full or reduced voltage starting, reversing or non-reversing, dynamic braking or multi-speed control of squirrel-cage, synchronous or wound rotor motors. Completely front accessible, the starter is compact and versatile, with the basic unit only 34 in. wide by 32 in. deep. It is available with either air break or oil immersed contractors up to 1500 hp at 2300 v, or 3000 hp at 4600 v. Short circuit protection of 150,000 kva at 2300 v and 250,000 kva at 4160 or 4600 v is provided by current limiting fuses. Allis-Chalmers Mfg. Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 275-276.

73—PROCESS PUMPS with "pull-out" feature

Figs. 3138 and 3139 are heavy duty process pumps for the pulp and paper and chemical industries, featuring back pull-out design for easy dismantling. They are single strap pumps with end suction and vertical split casing, and are available for capacities to 9000 gpm and heads to 160 ft. These pumps are designed especially for handling paper stock, white water, liquors, and for digesters circulating in paper mills, and also for slurries, tailings, contaminated waste matters or for any heavy duty service as required for liquids with solids in suspension. Spacer coupling between driver and pump, and the back pull-out design permits the entire rotating element to be removed from the casing without dis-





HOT

–30° TO 1100° F.

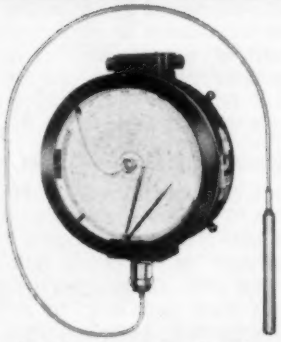
OR

COLD

WITH PARTLOW
THE TEMPERATURE IS
PRECISION-CONTROLLED

partlow

THE PIONEER IN MERCURY THERMAL CONTROLS



Recording Temperature Control

Degrees mean dollars. That's why Partlow Controls are used in more and more applications where temperature control is critical. Their pin-point accuracy insures positive protection for materials and equipment. Partlow Controls are precision-built for use with gas, oil, steam or water valves; or electrical equipment. Available in 9 standard ranges, from –30° F. to 1100° F.

THE PARTLOW CORPORATION
Dept. PE-1057, 2 Campion Road, New Hartford, N. Y.

We'd like to know more about Partlow Temperature Controls.
☐ Have representative call. ☐ Send us your CONDENSED CATALOG.
We are interested in Partlow Controls for the following applications:

Company.....
Street and Number.....
City.....State.....
Signed.....

For more facts circle 658 on Reply Card

Before you buy any boiler

compare quoted prices with REAL COSTS

New Cleaver-Brooks cost analyzer clears "quotation" confusion — reveals ALL costs

Get *all* the costs... the *real* costs ...down on paper before you recommend or specify a boiler to your clients. On many boiler installations "quoted prices" seldom agree with the total costs, as you may have learned. This is frequently the case with so-called "built-up" boilers assembled on the site.

Cleaver-Brooks' cost analysis enables you to compare all material costs (boiler, steam trim, burner, refractory, controls and other equipment) and installation labor costs. You'll know the "real costs" on the complete installation before you start.

Real eye-opener

The figures you'll see may be startling. In most cases the cost analysis proves a Cleaver-Brooks costs *less*. On-job time is drastically reduced because Cleaver-Brooks packaged units are fully assembled, ready to install. Cleaver-Brooks boilers give you more in performance, too . . . each boiler is fully fire-tested at the factory under load, tuned to peak economy. Starting service and on-the-job operator training by authorized field engineers further decreases your over-all costs.

Contact your Cleaver-Brooks agent

Once you add up all the benefits of a Cleaver-Brooks "one-cost" package... the proved trouble-free economy of exclusive four-pass, forced-draft design, you'll find it pays over and over to analyze costs carefully before you buy. See your Cleaver-Brooks agent for details or write Cleaver-Brooks Company, 364 East Keefe Avenue, Milwaukee 12, Wisconsin. Dept. L

Choose from 19 sizes, 130 models, 15 to 600 hp. Oil, gas and combination oil/gas fired — steam or hot water for heating or processing.

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

For more facts circle 659 on Reply Card

NEW PRODUCTS

(Begins on page 200)

turbing piping connections. You simply remove spacer from space coupling and bolts from casing cover. Casing is of shell volute type with drain and priming openings. Adaptability of pumps to a variety of services is attributed to interchangeability of parts and availability of parts in a variety of materials, including bronze fitted, all iron, all bronze, others. Goulds Pumps, Inc.

74—DIAPHRAGM VALVES of tough ductile iron

Ductile iron diaphragm valves are introduced to meet requirements for diaphragm valves with exceptional strength and resistance to fracture and thermal shock. Valves cast of this material have the tensile strength of cast steel and approach the economy of cast iron, says manufacturer, and the inherent toughness of ductile iron affords high resistance to impact damage. The valves are available as complete valves or replacement components of bodies, bonnets and handwheels and may be had with screwed ends (½ to 3 in.) flanged (½ to 8 in.). Bulletin 102 gives data. Hills-McCanna Co.

75—TORCH HEAD is versatile cutting aid

This angular machine-torch adapter is adjustable through the wide range of 250 deg. Because of the versatility of this unit, it replaces company's entire line of fixed angular heads. The cutting angle can be set without tools,

and without removing the accessory from the torch. Any required angle can be set between 0 and 90 deg either side of vertical, and within an additional 35 deg above horizontal. Both sides of the body bear indexing marks in increments of 5 deg. The angular head accommodates standard acetylene, propane and natural-gas tips, and is designed for service with Airco Style 4700 Cutting Torch. In addition to vertical and horizontal cutting, the device is expected to find use in bevel cutting, H- and I-beam work, flanging, structural shape cutting. Air Reduction Sales Co., Air Reduction Co., Inc.

New B&D No. 300 Impact Wrench slashes maintenance down-time!

LONGER LIFE: torque tests show it has higher performance, cooler running, longer life than any other.

MORE POWER PER POUND: this light-weight (only 13.5 lbs.) tool really packs a powerful punch!

EASIER HANDLING: no nose or tail heaviness. No starting torque twist. All-position auxiliary handle.

No. 100 IMPACT WRENCH: the rugged wrench for smaller applications; hits max. torque in 6 seconds!

Mail coupon today for free demonstration!

Now, Black & Decker takes the back-break out of moving equipment, installing new tools, making structural changes and many other like jobs! The new No. 300 Heavy-Duty Impact Wrench brings a minimum of 300 ft. lbs. of torque to bear—removes rust encrusted bolts as slick as a whistle—bangs home bolts as big as 1¼" effortlessly. The powerful No. 300 does the work—not the operator!

Look about you! Chances are you'll see many applications for this great, new, super-powered Impact Wrench—the tool that sets and removes bolts faster; saves you time and money. Then, mail the coupon for a free demonstration. A Black & Decker distributor will be happy to show you—in your own plant, on your own equipment—just how much the new B&D No. 300 Impact Wrench can slash *your* maintenance down-time! THE BLACK & DECKER MFG. CO., Dept. 0810, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

B&D Black & Decker®

Quality Electric Tools—Power-Built for powerful performance

MAIL COUPON TODAY

The Black & Decker Mfg. Co., Dept. 0810, Towson 4, Md.

☐ Please arrange a demonstration of your new No. 300 Impact Wrench.

☐ Send additional information.

Name.....Title.....

Company.....

Address.....

City.....Zone....State.....

For more facts circle 660 on Reply Card

TOCCO Chose Reading Electric Hoists ...

This Reading electric hoist is moving a sheet metal cabinet from a heating station to the production line. All Reading hoists at Tocco have the same two-button pendant control.

● Rapidly rising production goals are being met in Ohio Crankshaft's new Tocco Division plant in Cleveland's South Side . . . thanks partly to Reading Electric Hoists.

Tocco, a leading producer of induction heating equipment, designed the new plant to meet the needs of its rapid expansion. Pre-planned materials handling, involving trucks, bridge cranes and electric hoists, is paying off in fast, orderly movement of materials from operation to operation.

Playing a big role in this integrated handling system is a series of Reading electric hoists, "custom-built" from standard Reading units to meet the exact requirements of each operation. These hoists permit Tocco workmen to move all material without manual lifting.

Reading's unique "Unit Construction" plan offers you special equipment for your own plant at the low cost of standard parts. Investigate now this proven way to get faster, better materials handling. A note on your company letterhead will bring a Reading engineer to analyze your handling operations . . . at no obligation.

Reading Crane & Hoist Corporation, 2103 Adams St., Reading, Pa.

READING HOISTS

CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

For more facts circle 661 on Reply Card

New Plant Construction

(Continued from page 162)

built onto present plant. This expansion program to be completed by mid-1958 will represent an expenditure of $1 million, including equipment.

Atlas, Mo.—Atlas Powder Co., New Murphy Road, Wilmington 99, Del., will spend approximately $4 million for the replacement of nitric acid and ammonium nitrate facilities at local plant. Work on the two units will get under way at once with completion scheduled for March 1958. The units will be self sustaining, the first units of this type to be erected in this country. Chemical & Industrial Corp., Cincinnati, O., were awarded the contract for the construction and design of the acid units.

Salem, N. Y.—Anchor Hocking Glass Corp., 70 Glass Ave., Lancaster, O., plans to construct a new glass batch plant at the corporation's local plant here. Construction will include a group of concrete silos and an adjoining structural steel building to house new glass batch machinery. Automatic equipment, capable of mixing 1,000-tons of glass batch materials daily, will be installed and will be electronically controlled. New plant will go into production by spring of 1958 at a reported cost upon completion of about $2.5 million.

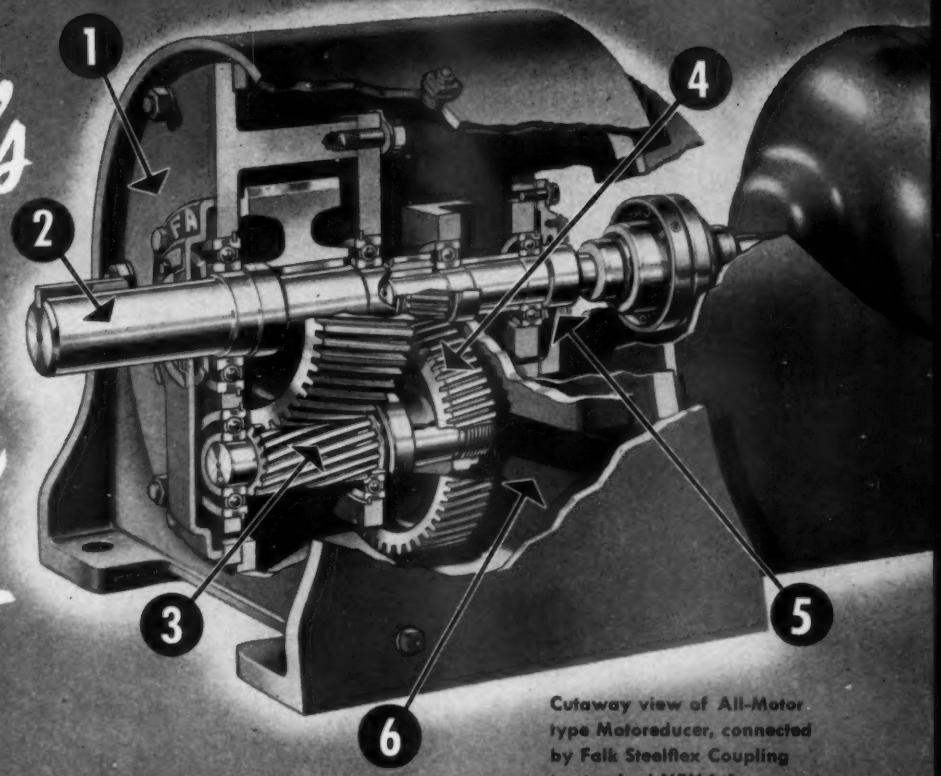
Kingston, N. Y.—Colonial Sand & Stone Co., Inc., 30 Rockefeller Plaza, New York, N. Y., has acquired a 300-acre tract of land with substantial deposits of limestone on which it proposes to build a cement mill with an initial capacity of 2500 bbl per day. Work on the new mill will get under way soon and will be ready for production late in 1958. Mill and equipment reported to cost about $2 million.

New York, N. Y.—Texas Co., Chrysler Towers, New York, N. Y., plans to construct a multi-million dollar natural gas processing plant in San Juan County, Utah, to process gas from the Aneth field in the San Juan Basin. Initial cost of the plant will be $6 million. Plant will produce natural gasoline, butane, propane and ethane.

Mandan, N. D.—Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill., plans to construct an alkylation unit for the production of a high octane motor fuel component. Work on the new unit will begin at once, for completion about September 1958. Facility will have an initial daily capacity of 1630 bbl, and will employ a licensed patent by Philips Petroleum Co. Construction contract has been awarded to the Foster-Wheeler Corp., 165 Broadway, New York, N. Y.

Avon Lake, O.—B. F. Goodrich Chemical Co., 2069 E. 9th St., Cleveland 15, O., has announced a major

Here's the inside story—



Cutaway view of All-Motor type Motoreducer, connected by Falk Steelflex Coupling to standard NEMA frame motor

WHY Falk Motoreducers give better service—have longer life

Here is the "inside story" behind the all-steel All-Motor type FALK Motoreducer's universal reputation as a gear drive unmatched in quality, efficiency, dependability, ease of maintenance and long life. These "In-built" factors are—

1 **ALL-STEEL HOUSINGS.** Rugged, strong, rigid...all parts are manufactured from heavy steel plate, formed and welded in the Falk Weld Shop.

2 **LARGE OVERHUNG LOAD CAPACITY.** Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum applied loads.

3 **PRECISION GEARING.** Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion. Quiet, crown-shaved pinions.

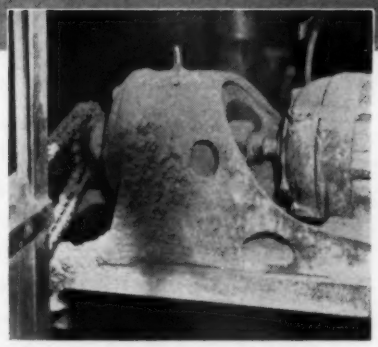
4 **EXTRA-CAPACITY GEARING.** Special extra-capacity gear-tooth form with larger contact area gives greater strength, higher load-carrying capacity.

5 **SEALED HOUSINGS.** Splashproof, dustproof, oil-tight construction. Dual closures and one-way vents keep oil in, dust and moisture out.

6 **POSITIVE LUBRICATION.** Large sump capacity...oiltight construction assures clean lubricant...revolving elements lubricated by direct dip.

When you buy or specify the All-Motor type FALK Motoreducer, you get all these—plus the tremendous advantage of full interchangeability of motors. Switch motors as desired—use any make, style or type of standard foot-mounted motor within the unit's AGMA rating—with a minimum of difficulty or "down time."

Available in sizes up to 75 hp—*with or without motor*—from convenient factory, field or distributor stocks, from coast to coast. **Write for Bulletin 3100.**



60,000 HOURS WITHOUT A FAILURE!

Sixty thousand hours is a lot of hours—but the FALK Motoreducer in the unretouched photo above has served that long without failure or need of repair.

This 3 hp unit is one of over 60 FALK Motoreducers in daily service in an Eastern plant of a large milling company, whose president says, in part:

"One of the main advantages of FALK Motoreducers is their adaptability to any motor. Reducers and motors can be easily interchanged....Our service records confirm the wisdom of our choice of FALK equipment as our standard."

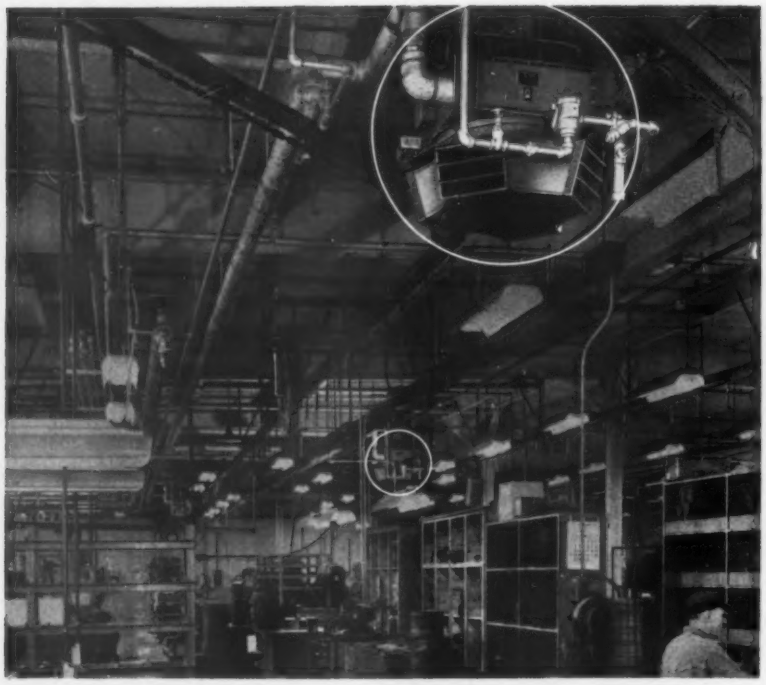
FALK ...a good name in industry

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

For more facts circle 662 on Reply Card



REVOLVING Heat will increase productivity . . . because

it plays no favorites!

You know how it is in some plants (perhaps in yours) . . . some lucky worker is located just *between* the steady fixed streams of hot air from the unit heaters, and he's the envy of the rest of the crew. Especially of those directly in the path of the hot air streams.

But in the plant heated by Wing *Revolving* Heaters, *everybody's* lucky . . . these heaters play no favorites. There *are* no steady streams of hot air. The slowly revolving outlets keep the air streams moving constantly, creating a gentle, warm refreshing breeze that keeps everybody happy and productive.

You ought to find out what they can do for you. Send for a bulletin.

L. J. Wing Mfg. Co.
DIVISION OF AERO SUPPLY MFG. CO. INC.

177 Vreeland Mills Road • Linden • N. J.
In Europe: WANSON, Heron Nord, Brussels, Belgium

Wing
•REVOLVING•
UNIT HEATERS

FANS • UNIT HEATERS • DRAFT INDUCERS • BLOWERS • TURBINES

For more facts circle 663 on Reply Card

New Plant Construction

(Continued from page 260)

expansion plan that will increase existing facilities for the production of Darlan dinitrile fiber. Work on the new facility is already under way for scheduled completion by spring of 1958.

Cincinnati, O.—Procter & Gamble Co., Gwynne Building, has announced plans for the construction of a new technical center which will permit the company to intensify product development and manufacturing administration activities. Buildings will be erected, campus style, on the 265-acre site and preliminary work is already under way.

Duquesne, Pa.—United States Steel Corp., 525 William Penn Place, Pittsburgh, Pa., will undertake a major construction program at company's Duquesne Works which specializes in the production of high quality carbon, alloy and stainless steel bars. Three high speed rolling mills will be built to replace present facilities for turning out blooms, billets and slabs. Construction of the new mills will take two years and dismantling of the present mills will require another year.

Phoenixville, Pa.—Phoenix Iron & Steel Co., Phoenix Steel Tube Division, plans to install a new oxygen producing plant. The new plant, to cost in excess of $500,000, will have dual generators, permitting maximum flexibility and reliability. Ground will be broken soon for completion by mid-1958.

Freeport, Texas—Dow Chemical Co., 1000 Main St., Midland, Mich., has authorized plans for the construction of an acrylonitrile plant at company's Texas Division located here. Construction work on the new facility will begin the early part of 1958 and will be placed in operation by February 1959.

Danville, Va.—Dan River Mills, Inc., 1407 Broadway, New York, N. Y., plans to construct new research and chemical manufacturing plant on a 13-acre plant site just outside the city limits. Tentative plans call for a two level building with approximately 50,000 sq ft of floor space. Building will be used in part for expansion of company's research facilities and in part for the manufacture of various chemicals required in company's manufacturing and finishing operations.

Staunton Va.—Westinghouse Electric Corp., P. O. Box 868, Pittsburgh, Pa., plans a major addition to existing plant located here engaged in the manufacture of air conditioning units. Building additions to main plant are planned to provide 87,000 sq ft of additional manufacturing area. New unit will be of concrete and metal construction and will be devoted to light manufacturing and warehousing. Plant with additional equipment will represent an investment in excess of $1 million.

Automatic DOCKER...THE LIFT TRUCK THAT WORKS WHERE OTHERS CAN'T

Shortest in its class... unmatched for easy maneuvering...and for efficient low-cost operation

This extra-compact, more maneuverable truck offers more advantages than any other of its type for materials handling in any industry. It is especially desirable where space is limited...works with ease inside trailers and in aisles, with or without pallet racks, too narrow for other similar trucks.

What's more, direct comparison shows clearly how definitely superior the DOCKER really is. Note the figures at right.

	DOCKER	TRUCK A	TRUCK B	TRUCK C
2000 LBS. WITH LOAD LENGTH OF	48"	30"	40"	30"
SHORTER..... OVERALL LENGTH LESS FORK	53⅞"	65⅞"	65½"	64"
SAFER-EASY ON, EASY OFF..... STEP HEIGHT	7"	13"	13¾"	13⅞"
MORE PRODUCTIVE..... LIFT SPEED F.P.M.	65	55	45	45
MORE VERSATILE..... GRADE CLEARANCE	45%	43.4%	45%	35%
MORE MANEUVERABLE... TURNING RADIUS	56"	59"	64"	57"
MAXIMUM HEAT PROTECTION. CLASS H, SILICONE INSULATED MOTORS—ALL MODELS	Yes	No	No	No

MAIL COUPON for complete specifications and FREE "COST-CUTTER" that shows how to chart and analyze your own materials handling needs.

CAPACITIES: 1000 to 4000 pounds

Factory Service Available in over 100 cities

AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale & Towne Manufacturing Company
Dept. T-7, 105 West 87th Street, Chicago 20, Illinois
WORLD'S LARGEST EXCLUSIVE BUILDERS OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

Automatic Transportation Company
Dept. T-7...105 West 87th St., Chicago 20, Ill.

Please rush me complete specifications for Automatic DOCKER...also FREE COST-CUTTER Booklet.

Firm Name.....*by*.....

Address.....

City & Zone.....*State*.....

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On-Spot Heating

(Continued from page 105)

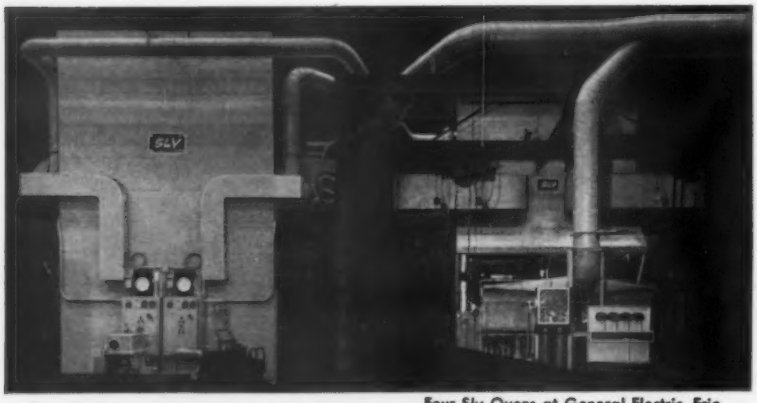
Any solids remaining in the water at this point are precipitated during subsequent recirculation. The solids that fall into the mud drum at the bottom of the header are removed by opening a single blow-down valve.

The large steam drum with its automatically maintained water level provides maximum safety from waterless operation. The size and design of this drum also facilitates circulation as the cooler water always sinks to the bottom, then through the short tubes into the upper portion of the header, thence onward to the bottom of the header and into the longer hot tubes (adjacent to the burner). The difference in temperature between these hot tubes and the cool water being forced in from the header results in high heat transfer.

While these boilers are a relatively new product, numerous usage reports from the field are already accumulating. A large electroplating shop in Los Angeles installed a boiler to heat the solution tanks. Electricity had been used up until that time. After boiler installation, the shop manager reported that tank heating costs had dropped from approximately $200 a month to around $90 a month. This is a fully automatic installation, with the boiler turning on in the morning so that the tanks are heated and ready to go at the beginning of the shift.

It also turns off automatically at the end of the day. In this installation, steam from the boiler, fed through thermostat-controlled valves is used to heat the solutions. Exhaust steam is not wasted, but is used to heat a hot water rinse tank.

In another shop, steam is employed to heat seven phonograph record presses. This is a critical use, as the presses must be operated at a constant, nonvarying pressure, or numerous rejects will result. Despite the fact that this boiler operates at 150 per cent of normal rating, it is so equipped with automatic controls that the required steam pressure never varies beyond acceptable limits.



Four Sly Ovens at General Electric, Erie.

4 SLY Ovens Give Close Baking Control at G. E.

Correct baking of varnish on armatures, field coils and frames is essential to insure full protection to the units in later use. Four tower-type Sly Ovens at the Direct Current Motor and Generator Department at General Electric Co., Erie, Pa., provide the exact temperature required. They are an integral part of production, assuring a smooth, continuous flow.

The ovens are arranged in pairs. Each is a double-compartment oven with a common wall separating the zones. Each zone has its own heating and control system and individually automatic, program controlled conveyor system to meet the required, preheat, first and second baking operations. Complete cycle includes preheating, varnish dip, 4-hour bake, varnish dip and another 4-hour bake. Operations are such that the ovens reach their required temperatures prior to the start of the work day.

This installation is typical of the time and money savings Sly Convectioneered Ovens bring to drying, baking and finishing operations. *Write for catalog describing Sly's complete line.*

Designers and Manufacturers of: Dust Control Systems, Industrial Ovens, Blast Cleaning Equipment, Tumbling Mills.

SINCE 1874 SLY

THE W. W. SLY MANUFACTURING CO.

4600 TRAIN AVENUE • CLEVELAND 1, OHIO

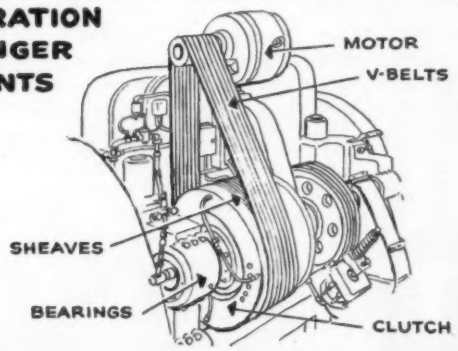
OFFICES IN PRINCIPAL CITIES

For more facts circle 665 on Reply Card

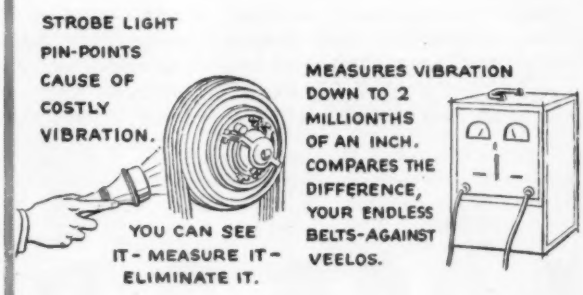
"Marital troubles again, Burns?"

A large steel company at La Puente, California, uses a high-efficiency boiler to heat four large steel pickling tanks. Here steam is admitted into the pickling solutions by opening a valve just enough to keep the solution at the proper temperature. Exhaust steam is allowed to waste. This company reports a tremendous saving in solution heating costs. At the time of this writing, the boiler had been in use for about 18 months without maintenance cost of any kind, and the only attention paid it is to turn it "off" and "on" to span non-working intervals. **End**

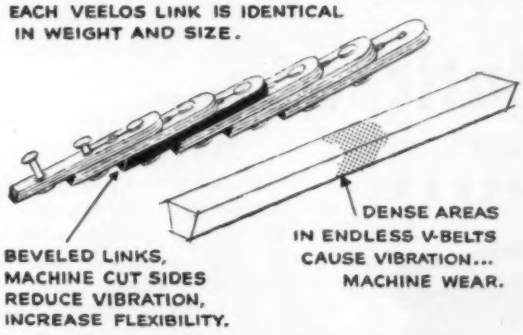
Here's Proof! Veelos Adjustable V-Belts Stop Costly Vibration in Your Drives



1. Watch out for these danger points. Machine vibration is caused by out-of-balance: in the motor, bearings, clutch, sheaves or V-belts. Often it is in the V-belts alone. This deadly vibration results in excessive machine wear, costly breakdown. But there's no need to guess or worry —your Manheim Veelos salesman can spot V-belt vibration in 15 minutes.


STROBE LIGHT PIN-POINTS CAUSE OF COSTLY VIBRATION.
YOU CAN SEE IT - MEASURE IT - ELIMINATE IT.
MEASURES VIBRATION DOWN TO 2 MILLIONTHS OF AN INCH. COMPARES THE DIFFERENCE, YOUR ENDLESS BELTS-AGAINST VEELOS.

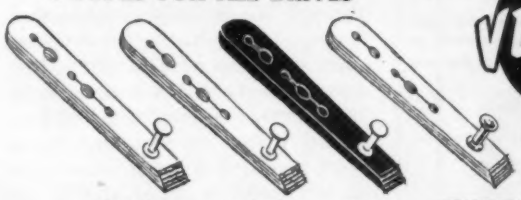
2. Veelos offers you electronic proof! Your Manheim Veelos salesman will prove that Veelos cuts V-belt vibration up to 89% *more* than any belts you're now using. This amazing vibration analysis pin-points the belt that has the "invisible shakes" . . . and tells you exactly how much money-costing vibration is present. You owe it to yourself and your company to see this Veelos V-belt test.


EACH VEELOS LINK IS IDENTICAL IN WEIGHT AND SIZE.
BEVELED LINKS, MACHINE CUT SIDES REDUCE VIBRATION, INCREASE FLEXIBILITY.
DENSE AREAS IN ENDLESS V-BELTS CAUSE VIBRATION... MACHINE WEAR.

3. Install Veelos for smoother drives! Balanced construction of Veelos belts assures you faster, cleaner work, less rejects—less bearing wear. Each Veelos link and stud is identical in size and weight. As you know, endless belts have varying spots of density which cause excess vibration. This excess vibration increases chatter marks, machine wear and overall poor production output.

4. Veelos won't stretch any more than any other V-belt, when correctly installed on properly belted drives. Remember to follow the simple instructions on every reel—measure Veelos 1" per foot short of pitch length and roll on drive as tightly as possible. When installed this way, tension may *seem* excessive. However, this initial tension drops to normal when drive begins to run.

4 TYPES FOR ALL DRIVES



REGULAR For general service

OIL PROOF For oily and hot drives

COATED For wet or oily drives

STATIC-CONDUCTING (with non-ferrous studs) For explosive atmosphere, oily and hot drives

VEELOS® THE BALANCED LINK V-BELT

Known as Veelink outside U.S.A.

MANHEIM

451 Qualified Distributors

Write for free Veelos Data Book or Veelos Vibration Demonstration to: Manheim Mfg. & Belting Co. 804 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists since 1911"

©M. M. & B. Co. 1957

For all sizes and types of drives. Double-V available for serpentine drives.

For more facts circle 666 on Reply Card

Fast Whirl Improves Product

(Continued from page 129)

timer shuts off the high speed two minute run. But this magnetic brake is automatically actuated the instant an out-of-balance condition exists in rotation—an extra safety precaution.

This out-of-balance is detected by an impact switch that is, in effect, a vertical pendulum with a mass (weight) at its top. This pendulum has at its base a ball and in the ball is a contact for a Micro-Switch. The ball end of the pendulum rides in a concave socket in whose center is the other contact of the Micro-Switch. In normal, perfect balance the pendulum remains perpendicular but any imbalance or out-of-perpendicular immediately actuates the Micro-Switch that stops the motor and throws on the magnetic brake.

An added precaution against faulty loading is mounted-in stroboscope that pinpoints light weight cartridges and these may be brought up to weight by the addition of lead shot. It is interesting to note that the balance and mass of the rotor is so nearly perfect uniformly loaded cartridges seldom call into use the stroboscope.

The machine is enclosed by a 42 in. diameter cylindrical housing on which are mounted the few controls. There is a "start" and a "stop" button and between and below them is a brake release that permits the operator to turn the rotor for loading. To the left of these controls is the Eagle timer and to the right of the buttons is a tachometer.

As the winds generated by the rotor in motion are fairly severe a spun aluminum hemisphere encloses the top of the centrifuge. This hemisphere is in two parts, the inner one rolling on Micarta wheels to open up the machine for loading and unloading.

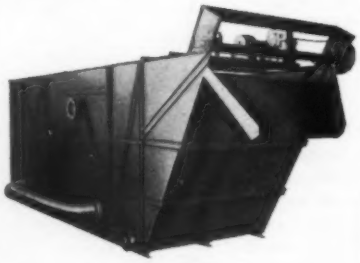
This production centrifuge, designed and made by plant engineering in the El Segundo Division of Douglas Aircraft had been in operation for over five months before the first service call, other than planned lubrication, was made on it. This call required only an adjustment on the braking mechanism. Other than that there has been no maintenance. **End**

1,000 G.P.M.
Micronic Filtration

THE

Delpark **Filter-Matic**
Tubular Screen
VACUUM FILTER

You get micronic filtration at high flow rates in the compact Delpark Filter-Matic. Designed for minimum space, the Filter-Matic combines highly efficient filtering elements with fully automatic self-cleaning mechanisms. The filtering elements are permanent and eliminate the usual expense of filter media. Clean coolant flow from the filter is not interrupted during the cleaning cycle. Requires minimum attention. Capacities range from 5 G.P.M.



Free FILTER GUIDE
Write for Delpark's new 8 page bulletin on Filtration for Industry

Delpark

. . . FIRST in Filtration Advancement

INDUSTRIAL FILTRATION COMPANY
165 INDUSTRIAL AVENUE
LEBANON, INDIANA

For more facts circle 667 on Reply Card

Building a Plant?

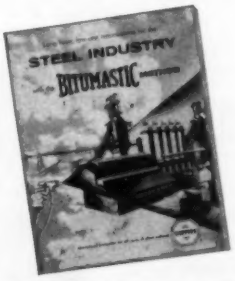
(Continued from page 138)

The first step was incorporation of all departmental offices in the connecting buildings between plants. Here the offices would be near the operations they served but out of the path of future expansion. Where offices or laboratory space were essential at the operation, they were placed where they would not hinder growth and where traffic would be out of the actual production area.

Locker rooms, lunch rooms and toilet facilities were placed in the basements of the manufacturing buildings so that personnel travel within each building would be through the basement, rather than through manufacturing areas. Basement entrances were located so that future growth of any section would not encroach on the established personnel routes. Where lunchrooms were provided at other locations—in the shipping center and in the connecting building housing the boiler plant—efficiency and expansion were placement criteria. **End**

Metal Buildings have longer useful life when they are protected against corrosion by Bitumastic coatings. This oil company warehouse was completely cleaned, then coated with a system using Bituplastic® No. 28, a sunlight-resistant coal-tar coating. Added life of the structure through this treatment is estimated at 10 years.

Concrete "Corrodes," Too, under the attack of acid or alkaline solutions. Pipe underground is especially subject to deterioration: that's why this new sewer line is protected, inside and out, with two coats of Bitumastic Super Service Black.



Metalworking Maintenance Men will find this new booklet from Koppers a useful reference in planning corrosion-preventive practices. It outlines the usual recommendations for various surfaces and application techniques to insure long-term protection of plant structures and equipment. Write for your copy using coupon below.

Koppers Company, Inc.
Dept. 115K
Pittsburgh 19, Pa.

Please send me "The Bitumastic Method to Prevent Corrosion in the Steel Industry."

Name_____

Company_____

Address_____

City_____ State_____

how to
CUT CORROSION LOSSES
a report by Koppers Company, Inc.

C. U. Pittman
Supervisor Technical Service

Ideally, effective corrosion control should start in the design stage of a new building or unit. The design engineer—by avoiding sharp edges, grooves, thin supporting members, etc.—can eliminate many of the common starting points for corrosion.

But in any case, the first step in preventing corrosion is *adequate preparation of the surface* before applying the protective coating. A really good—and economical—protective coating should *prevent* corrosion, not just cover corrosion products.

* * *

Most authorities agree that there are two chief objectives in good surface preparation: removing contaminating materials and producing a surface that will promote a good mechanical bond with the coating. The life and effectiveness of the coating system depends upon the degree to which you attain either of these objectives.

Actually, a tightly adherent surface of mill scale would make an ideal protective coating in itself—*if* temperatures remained constant. But since the scale and the virgin metal have different co-efficients of expansion, temperature changes and mechanical flexing cause flaking of the mill scale even under coatings. (Note: In over-the-ditch coating, it is not practical to remove all mill scale—buried pipe is not so subject to temperature change.) Another problem with mill scale is that electrochemical action between the mill scale and the metal accelerates corrosion and causes pitting.

Rust provides a certain amount of protection by slowing corrosion. But since it is non-adherent and porous, corrosion continues.

To perform an effective, long-life job, any coating must have a proper surface to which it can adhere. As revealed by photomicrographs, a slight roughness produces the best mechanical bond by increasing surface area and providing a tooth for the coating. Chemical bonding depends on the inherent molecular structure of the coating material. Some coatings must depend on a mechanical bond only. But coal tar coatings, having polar groups, will bond chemically as well as mechanically.

* * *

The important point on which most corrosion engineers agree—and which our applications research has proved—is that surface preparation is an integral part of the coating specification. By paying as careful attention to surface preparation methods as to selecting the right coatings, you will assure trouble-free, economical corrosion control.

* * *

We will report to you soon on the various surface preparation methods. In the meantime, we'd like to hear about your corrosion problems. Write: Koppers Company, Inc., 1450 Koppers Building, Dept. 115K Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario and Edmonton, Alberta.

KOPPERS

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COATINGS AND ENAMELS

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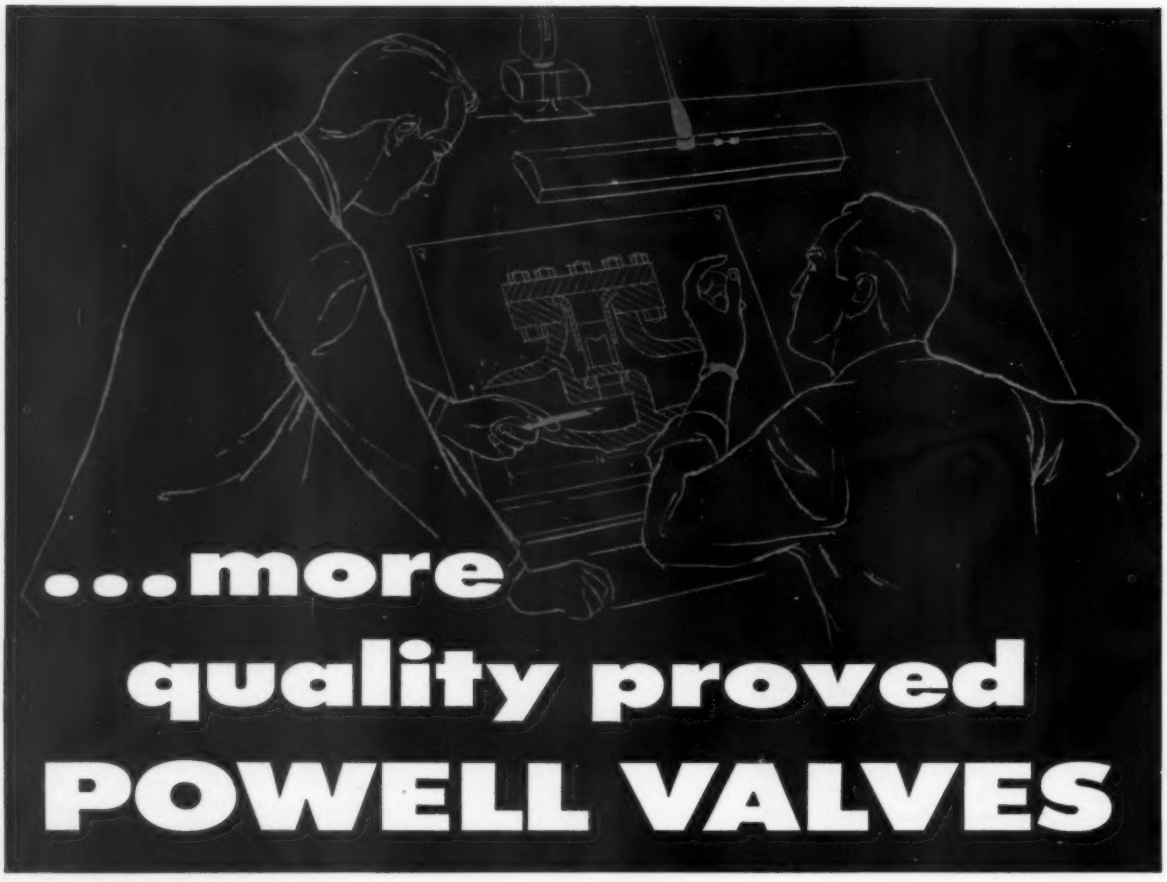


...more quality proved POWELL VALVES

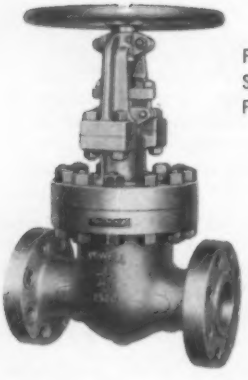


FIG. 1303 SS—1500-Pound Stainless Steel Gate Valve for handling Boiler Feed Water Treating Compound.

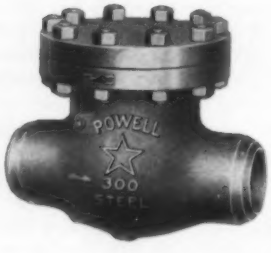


FIG. 3061 WE—300-Pound Steel Swing Check Valve.

FIG. 1314 A—1500-Pound Integral Bonnet Steel "Y" Valve.

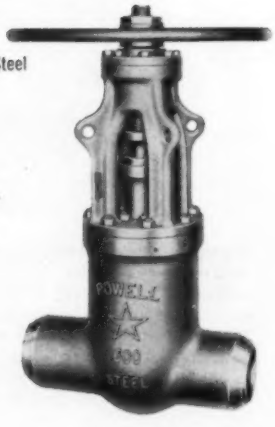


FIG. 16003 WE—600-Pound Steel Pressure Seal Gate Valve.

Designed for long life, designed for dependable service

Consult your Powell Valve distributor for all the facts about quality proved bronze, iron, steel and corrosion-resistant valves. No matter what the flow control problem, a Powell Valve can solve it . . . *better.*

THE WM. POWELL COMPANY, CINCINNATI 22, OHIO . . . 111th YEAR

For more facts circle 669 on Reply Card

Plastic Piping

(Continued from page 131)

it is unaffected by most acids and alkalies, as well as salt, oil, water and alcohol solutions—which represent some of the mixtures that would be produced in the school laboratory.

Figure 4 shows a representative sampling of the various types of drainage fittings available in PVC. These fittings, made by Tube Turns Plastics, Inc., range in size from 1½ in. to 4 in. They match Schedule 40 PVC pipe of corresponding dimensions.

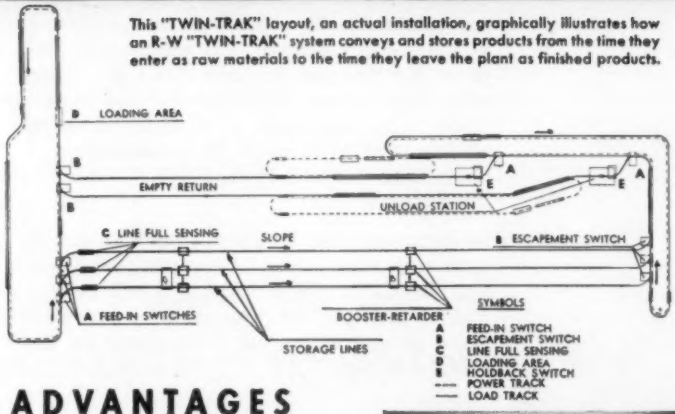
According to Tube Turns company spokesman, there are twelve advantages to be gained by using PVC piping and fittings in drainage lines. These are: pipe cost per foot is low; unit cost of fittings is low; few joints are required, because the pipe lengths are long; a minimum of labor is required per joint; few tools and materials are required for making joints; low deadweight is

encountered in plastic piping systems; PVC pipe is easily handled and transported; breakage is at a minimum; socket joints provide unimpeded flow characteristics; the joints are durable, not affected by vibration; ground conditions do not affect the pipe; galvanic or electrolytic action does not prove harmful to plastic pipe.

Four-inch transfer lines are shown in Fig. 5. Here again, the installation is at the Reheis Co., site of the manifold shown in Fig. 1. Rigid vinyl pipe, made from Geon by Alpha Plastics, Inc., is assembled with cemented socket fittings. Flanges are used extensively, to permit easy disassembly.

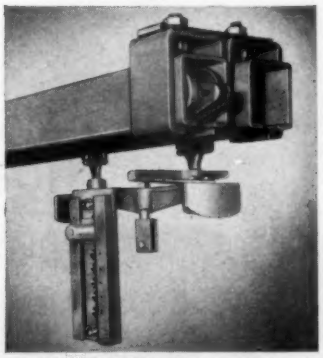
In the Reheis installation, some 6200 linear feet of 2-in. to 4-in. PVC pipe, 4930 fittings and 180 valves with PVC bodies were used in the plant. **End**

This "TWIN-TRAK" layout, an actual installation, graphically illustrates how an R-W "TWIN-TRAK" system conveys and stores products from the time they enter as raw materials to the time they leave the plant as finished products.



ADVANTAGES

- **Provides trouble-free, automative-selective control over product movement through entire plant.**
- **Economical and practical . . . provides added storage space . . . saves time, labor and money.**
- **Automatically supplies component parts to work stations from storage banks or lines.**
- **Economical to install . . . extremely flexible . . . quickly and economically revised or modified to meet your changing needs or future expansion plans.**
- **Ideal for conveying and dispatching products in multiple story buildings.**
- **Designed, manufactured and backed by the leading firm in this field for over 75 years.**



An R-W "TWIN-TRAK" System consists of one or more power tracks and as many storage or free tracks as desired. Available with efficient, economical manual or electronic selective controls designed to effectively meet your specific requirements.

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Leading manufacturer of Track Hangers, all types of hardware and Electric Door Operators for over 75 years.

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MANUFACTURING COMPANY
Materials Handling Division

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Efficiency

to the job...

Maximum head and delivery as compared to power consumed are the big factors in pumping efficiency. So regardless of the type of pumping job you have, you want a unit that gives the best results. You can't go wrong when you specify an Ingersoll-Rand Motorpump . . . available in a wide range of models from ¼ through 75 horsepower . . . capacities to 2800 gallons per minute . . . heads to 650 feet.

Motorpumps are compact, easy to install units with a versatility of mounting positions. Full details on I-R Motorpumps will be furnished promptly by your nearby Ingersoll-Rand branch office, or write direct for the latest catalog.

MOTORPUMP

by

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

9-670

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"Electronic Longhand"

(Continued from page 123)

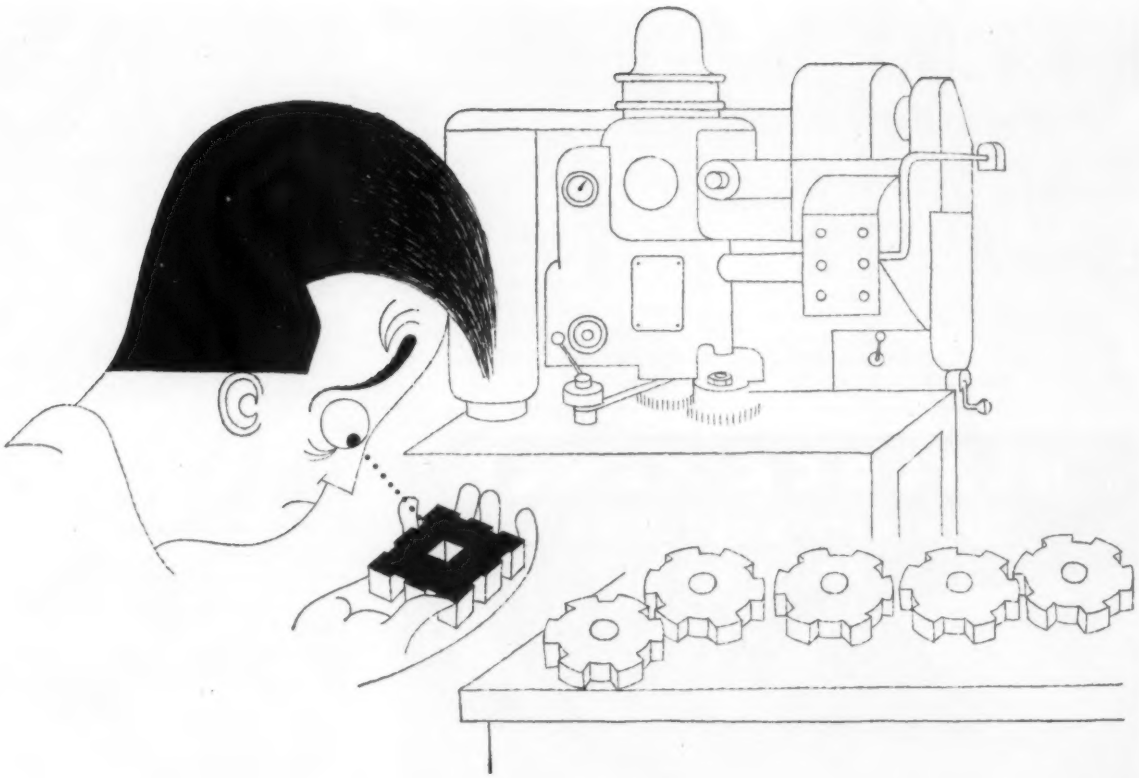
tion of each appliance into the machine, which automatically transmits the information to the various parts supply areas. At the right time and the right place, the correct components for each model are delivered to the assembly line by conveyors for quick, precision installation. The practice, although common in automobile plants, is a novelty in the appliance industry. Its obvious advantage to the manufacturer is that it enables him to build a variety of models consecutively, to match orders from large-volume dealers or distributors for carload and truck shipments. With its use, completed refrigerators can be moved directly

"First time in months we've had a breakdown in your department"

into the boxcars or trucks from the final assembly line, without extra handling in and out of warehouse areas.

The Telautograph system, sometimes referred to as "electronic longhand", has its central station at the start of the main assembly line, along which the principal cabinet components are brought together in preparation for the final assembly of the cabinets, built in Grand Rapids, and refrigerating systems, made in Detroit. These major cabinet components are the housing, or external shell; inner food storage compartment liner; food compartment door; and refrigerating systems.

The Grand Rapids plant offers a study in modern assembly methods and parts processing. Actually the two are closely linked; assembly starts with processing. **End**



Got a machining problem?

You may need **MAX-EL 3½**—a high quality, free-machining, deep-hardening alloy steel promptly available from Crucible warehouse stocks.

THE PROBLEM: Your maintenance shop frequently gets machining jobs, but not enough of them to justify the cost of heat-treating equipment. Still, you're losing money on steels that are hard to machine. So you call your Crucible warehouse—

THEY RECOMMEND: Max-el 3½ Alloy Steel, which can be readily machined (even into intricate parts) without final heat treatment. This steel has already been stress-relieved and heat-treated at the mill which also minimizes the possibility of distortion. And its deep-hardening characteristics give you the strength, toughness and hardness you need for parts such as gears, axles, pinions, shafts and spindles.

High quality, free machining Max-el 3½ Alloy Steel is only one of the dozens of special purpose steels stocked at local Crucible warehouses. Remember: Crucible is the only specialty steel producer *fully integrated to the point of use.* This means control and responsibility from raw material to warehouse delivery to you.

STOCKS MAINTAINED OF:

Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, Hy-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

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Crucible Steel Company of America

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For more facts circle 672 on Reply Card

NEW BOOKS

for the plant engineer

Product Design

DESIGNING FOR PRODUCTION by E. N. Baldwin and B. W. Niebel. Size 9¼ by 6⅜ in.; over 625 pp; illustrated; cloth bound. Published by Richard D. Irwin, Inc., Homewood, Ill. Price $8.40.

DESCRIPTION of materials and processes in this book is slanted for the product designer. The book contains information bearing on the selection of material. In line with the latter, a number of factors have been given consideration, such as service life, first cost, maintenance requirements, processing and function.

Some of the processes treated in the book are as follows: sand and die casting; hammer and press forging; shearing; cold rolling; extrusion; coining; drilling; surface grinding; induction hardening and braze-welding.

There are individual chapters on materials, namely ferrous metals, nonferrous metals, plastics, natural and synthetic rubbers. Matter on ceramics appears in a chapter on miscellaneous engineering materials. The book also has chapters on patents, automation and quality control.

Techniques

TECHNIQUES OF PLANT MAINTENANCE AND ENGINEERING. Size 11¼ by 8⅝ in.; 273 pp; cloth bound. Available from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. Price $10.00.

PROCEEDINGS of technical sessions held during the time of the 1957 Plant Maintenance and Engineering Show have been compiled in this handy reference. The book offers a great deal of information pertaining to plant engineering activities. It includes contributions from responsible people in a number of industries and the U. S. Navy, in the way of papers and pertinent discussions.

Among the topics of the papers presented during the technical sessions and covered by this publication are the following: maintenance cost controls; maintaining mobile handling equipment; painting; preventive maintenance of power distribution equipment; the role of lubrication in preventive maintenance; yardsticks by which to measure maintenance effectiveness; training maintenance and engineering personnel; and sanitation.

Engineering Design and Data

FOGLE'S ENGINEER'S HANDBOOK. Size 10⅞ by 8½ in.; 95 pp; illustrated; paper bound. Published by William Fogle, Box 2322, Station 28, Los Angeles 28, California. Price $15.00.

THIS BOOK PRESENTS a collection of quick-reference information; it offers considerable tabulated data and includes numerous illustrations showing design details. The material pertains greatly to tanks and piping.

Some of the items that appear in this handbook are as follows: piping symbols; weld sizes for pipe branches; illustrated design details of a fabricated steam separator; tank foundation details; dimensions for self-supporting stacks; tank volumes for horizontal tanks with various ends; riveting data; tank car clearances and dimensions; and fireproofing details for towers. **End**

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- standard heights, 5 to 13 feet inclusive, or higher if desired
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Sylvania Reflector Fluorescent Lamps provide up to 60% more useful, directed light.

Sylvania offers a new, complete line of reflector fluorescent lamps

NOW YOU CAN ENJOY up to 60% more *useful* light with Sylvania Reflector Fluorescent Lamps . . . using your present equipment.

The new, expanded Sylvania line of reflector fluorescent lamps includes both Single-Pin and Bi-Pin types in a wide range of colors and wattages.

The reflector fluorescent lamp has a built-in reflector that directs more usable light where it is needed.

This increased, controlled brightness provides better light in bare-lamp installations without reflectors . . . or where fixture reflectors quickly accumulate light-reducing dirt.

Sylvania reflector fluorescent lamps offer high light output . . . save time and dollars usually spent on maintenance. They are particularly suited for industrial areas . . . for supermarkets and retail shops, general high ceiling strip lighting, and for *directed* light in windows, cabinets, coves, valances, etc.

For complete information about the new line of Single-Pin and Bi-Pin reflector fluorescent lamps, call your Sylvania Supplier, or write:

SYLVANIA ELECTRIC PRODUCTS INC.
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Sylvania Reflector Fluorescent Lamps come in a variety of colors and wattages for all fixtures.

SINGLE-PIN

Length	Watts	Bulb	Color
48"	39W	T12	Cool White
96"	73W	T12	Cool White
96"	73	T12	Warm White
96"	73	T12	Super DeLuxe Cool White

BI-PIN

Length	Watts	Bulb	Color
18"	15	T12	Cool White
18"	15	T12	Super DeLuxe Cool White
24"	20	T12	Cool White
24"	20	T12	Warm White
24"	20	T12	Super DeLuxe Cool White
36"	30	T8	Cool White
48"	40	T12	Cool White R.S.*
48"	40	T12	Warm White R.S.*
48"	40	T12	Super DeLuxe Cool White R.S.*
48"	40	T12	DeLuxe Warm White R.S.*
60"	90	T17	Cool White

*Rapid Start

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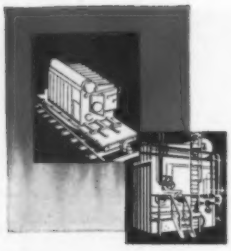
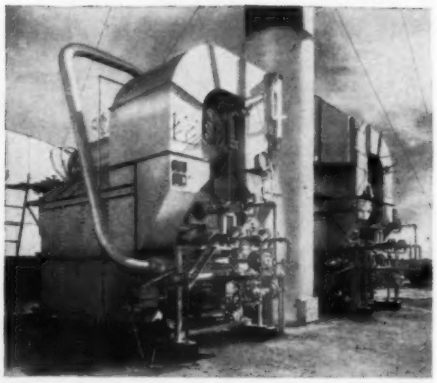


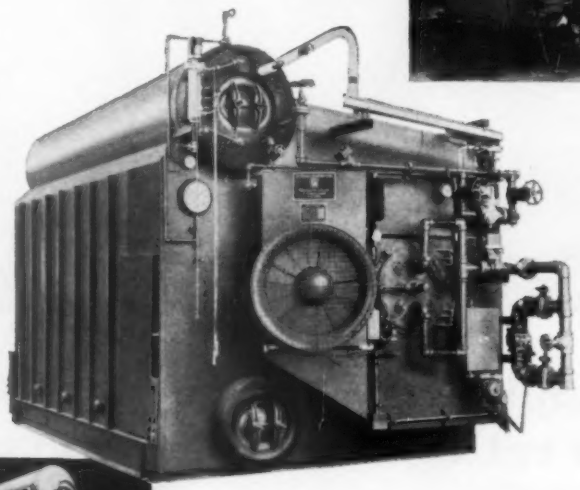
HEAT ENGINEERING by FW

extends Central Station Reliability to Standard INDUSTRIAL and PACKAGED UNITS

PACKAGED STEAM GENERATORS of the water-tube type were introduced by Foster Wheeler in 1940 — combining in a single, compact, shop-assembled unit, all the necessary facilities for the dependable and economical generation of industrial steam. Continual research and development have resulted in further improvements in design and construction, and today the FW line of Packaged Steam Generators, in capacities from 10,000 to 60,000 lb/hr, represents the last word in modern steam plant design, reflecting over half a century of service to the power generation industry. Features include 36″ steam drum and 24″ water drum, staggered boiler tubes, closely spaced waterwall tubes, water-cooled target wall, and wide choice of burners and controls.

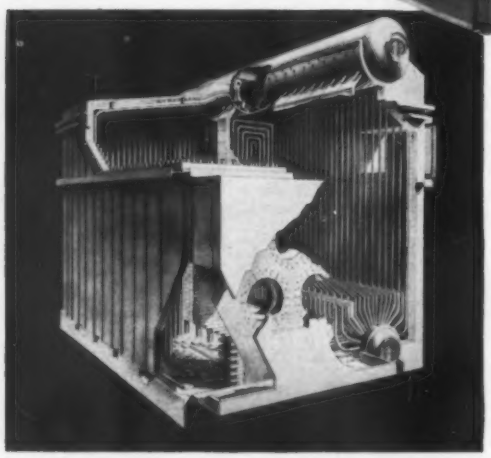


Above: Two FW packaged boilers — the first ever offered to industry — were installed for oil field drilling operations in 1940. They are still in service, delivering low-cost steam.



Left: New Foster Wheeler series AG-100 Packaged Steam Generator.

Cutaway view of typical FW Standard Steam Generator.



STANDARD PRE-ENGINEERED UNITS by Foster Wheeler offer all the advantages and economies of *standardization* for larger industrial steam generators of from 50,000 lb/hr to 450,000 lb/hr capacity. The new FW line of "SC" and "SD" standard units is heat engineered to the same standards of dependability and performance which have made Foster Wheeler steam generators first choice in many of the leading central station plants throughout the country. Features include completely water cooled walls, efficient firing arrangement, fully drainable superheater, high steam purity, unrestricted circulation, pressure-tight construction and minimum refractory baffling. For further details, send for Bulletin B-55-4.

FOSTER WHEELER

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BULLETINS

(Begins on page 21)

BOILERS, HEAT EXCHANGERS

143 Packaged Automatic Boilers — Bulletin 1243 describes company's packaged automatic boilers for steam or hot water heating and hot water service. Detailed illustrations of both oil and gas fired units are included, as well as tables of dimensions, ratings. Orr & Sembower, Inc.

144 Heat Exchanger Costs — This 20-pp catalog contains design and cost comparison data on heat exchangers using company's integral low-finned tubing. Presents an analysis of the comparable costs between a plain condenser tube and the low-finned shell and tube exchanger over a range of common applications. Wolverine Tube, Div. of Calumet & Hecla, Inc.

145 Heat Exchangers — One of two 6-pp bulletins, TE-1, on heat exchangers and heat recovery equipment, describes a heat recovery system for utilizing heat contained in waste process liquids in the textile industry. The other bulletin, HE-1, covers removable tube bundle type and fixed tube plate type exhangers. The Sims Co.

ELECTRICAL

146 Package Unit Substation — This 8-pp bulletin explains the advantages substations offer when used in modern electrical systems, and shows a complete line of company's equipment designed to meet modern electrical system needs. Both high and low voltage components are covered. Square D Co.

147 Protected Transformers — Construction and design features of self-protecting transformers in ratings 3 kva through 100 kva, 15 kv and below, are covered in 8-pp Bulletin 61 B 7309C. Tells how transformers, which are self-protecting against lightning, overloads and short circuits, improve service continuity, reduce operating and maintenance costs, and increase revenue. Allis-Chalmers Mfg. Co.

148 Power Lighting Cable — Bulletin RR-10 describes company's Type RR-10 cable for power and lighting service. Technical characteristics of direct buried, aerial or conduit installations and sheaths are included, as well as tabular data giving physical dimensions. Triangle Conduit Co., Inc.

149 Terminals and Connectors — Bulletin S7, 12-pp, describes company's pressure terminals and connectors available in pocket-size packages. Lists various connector dimensions, and includes actual-size outline drawings of each. The Thomas & Betts Co.

150 Magnetic Starters — Bulletin GEA-6611, 20-pp, contains comprehensive data on company's magnetic motor starters for such applications as machine tools, pumps, hoists, blowers, saws, fans, mixers, compressors, food processors, and motor control center. Such advantages as fast installation, simplified wiring, easy inspection and maintenance, long life, dependable operation and maximum flexibility are covered. General Electric Co.

151 Low-Voltage Capacitor — Twelve-pp Bulletin GEC-1331A describes low-voltage industrial capacitors suitable for indoor or outdoor shunt application. Lists ratings, weights and dimensions of capacitor units and equipments, and includes diagrams and pictures. General Electric Co.

152 Panel Meters — This 16-pp catalog describes panel meters that meet JAN 1-6 and MIL-M-6B specifications. Gives dimensions and performance data for D'Arsonval-type ammeters, millivoltmeters, and voltmeters as well as a-c rectifier-type microammeters, milliammeters, and voltmeters. Information on custom meters is included. Waters Mfg., Inc.

153 Battery Users Manual—Motive-power battery maintenance and repair is detailed in this newly revised edition of company's Battery Users Manual (Bulletin GB-1599A), 44-pp. Developed as a result of in-plant training courses, this book is designed to enable plant engineers to conduct an organized battery training course in their own plants. Encompassing maintenance, repair and selection, this reference book includes over 60 photos, diagrams and tables to review battery theory and construction, demonstrate proper selection, illustrate charging method and equipment, demonstrate testing. Gould-National Batteries, Inc.

COMMUNICATION

155 Two-Way Radio — Six-pp Bulletin ECR-106B tells how to modernize materials handling operations with two-way radio. Contains information on FCC licenses and types of equipment available for various applications, and describes company's LPI (low power industrial) unit, designed for use on gasoline or battery-powered vehicles. General Electric Co.

156 Closed-Circuit TV — Catalog PD-500 describes features and applications of company's self-contained closed circuit television camera. Specifications and dimensions given. General Precision Laboratory Inc.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

157 Machine Tools — This 48-pp catalog describes company's line of light-heavyweight machine tools, including those recently introduced. Covers band saws, circular saws, cut-off machine, drill presses, radical drills, grinders, lathes, others. Components of many tools are listed separately so as to permit building of low cost machinery for a particular production job. Capacities, speeds and dimensions of each model are listed separately to enable easy selection. Walker-Turner Div., Rockwell Mfg. Co.

158 How to Weld Stainless — "A Guide to Better Welding of Stainless Steels" is a 20-pp pocket-size booklet intended for both the novice and experienced welder. Presented in question-and-answer form, it is illustrated with drawings and close-up photos to clarify both problems and solutions. Arcos Corp.

159 Welding of Steel Castings—This 52-pp reference manual covers recommended practice for repair and fabrication welding of steel castings. The result of a research project conducted by Battelle Memorial Institute and the Steel Foundry Research Foundation, it describes welding methods—including preparation for welding, effects of welding, and the welding operation—and includes a section on electrode classification and weld-metal properties. Additional sections cover trade names and manufacturers of electrodes and procedures for welding specific castings. Tempil Corp.

160 Hard Surfacing Electrodes — Electrodes suited to hundreds of hard surfacing applications are described in 20-pp Catalog HS-56. Information is also furnished on how to decrease porosity, cracking, penetration and weld metal dilution with these low hydrogen electrodes. Physical and chemical properties of typical deposits for each of the 16 electrodes are charted. Metal & Thermit Corp.

161 Guide to Boring Bars—Catalog 58, 38-pp, lists 332 standard general purpose boring bars. Presents a comprehensive range of newly designed standard single tool and two tool boring bars, sets and accessories. Includes application, dimensional and carbide data. Simple engineering illustrations and flip charts facilitate selection of correct bar with NMTB taper, Morse taper or straight shank for a specific application. DeVlieg Microbore, Div., DeVlieg Machine Co.

162 Optical Tooling Principles — In this 56-pp optical tooling manual, photos and drawings illustrate major instruments and accessories; drawings show optical principles used in applying the equipment. Chapters are devoted to jog alignment telescopes, optical micrometers, scales, targets and mirrors, spherical adapters, other equipment. Keuffel & Esser Co.

163 Automation in Industry — Fast-rising use — and need — of multiple spindle tools in industrial assembly processes are discussed in 24-pp Catalog JE-2201. Discusses assembly problems of varied industries, cites basic questions and answers about multiples, details planning of bolt-spacing patterns and arrangements. It describes regulator mountings, air supply, suspension, maintenance, and related installation aspects of portable and machine-type multiple spindle tools. Thor Power Tool Co.

164 Machining Aluminum — Three machinists' aids—including a guide for machine feeds and speeds, a quantity-weight slide rule calculator, and a manual of basic information on machining aluminum are offered to promote advantages of aluminum. The guide furnishes approximate cutting speeds and feeds of aluminum with standard automatic screw machine tools, and covers form turning, skiving tools, cut-off drilling, reaming, box

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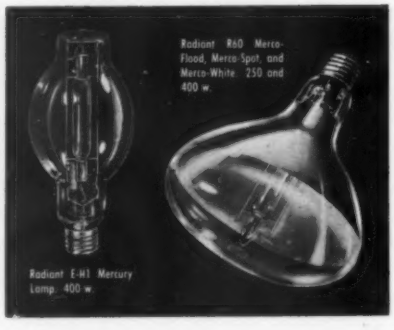
Radiant Bulletin 27 shows how. Send for it now.



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BULLETINS

(Begins on page 21)

tools and hollow mills, external threading, tapping, thread rolling, cross slide knurling, and turret knurling. The calculator gives pounds per 1000 pieces of hexagonal and round stock, and lists typical mechanical properties for aluminum screw machine stock. Third item is a loose-leaf manual of operator reports which will be supplemented with monthly insertions, gives fundamentals on machining. Kaiser Aluminum & Chemical Sales, Inc.

SAFETY, SANITATION

165 Safety Equipment — Catalog 10, 48-pp, presents company's entire line of safety equipment in an easy-to-use buyers'-guide arrangement. Catalog includes all types of protective equipment—from a small dust mask to a large barrel lifter. Profusely illustrated, it gives specifications and recommended use for all items. Equipment is grouped according to its function. General Scientific Equipment Co.

166 Tips on Good Washrooms—Provided in this handsomely illustrated brochure are suggestions for improvement of plant washrooms. Also includes information on washroom advisory service available to plant engineers. Scott Paper Co.

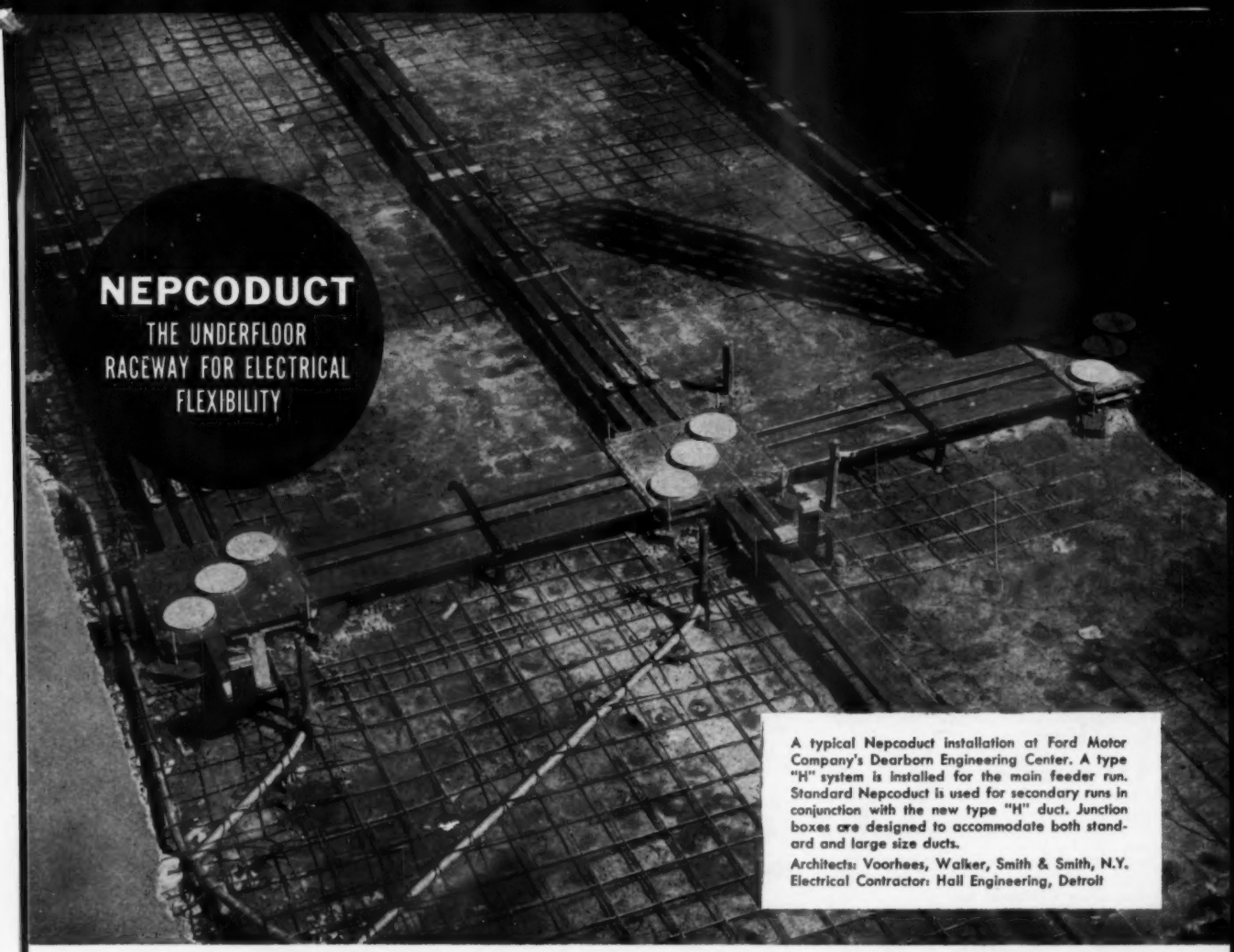
167 Preventing Dermatitis — This 12-pp booklet cites hazards of epoxy dermatitis and lists 36 specific and practical rules for prevention. Recommendations are grouped under five headings: education of workers and supervisors; company housekeeping procedures; ventilation; personal cleanliness of workers; and use of protective creams and clothing. Milburn Co.

SEALANTS

168 Fastener Sealant—Technical Report 5, 12 pp, gives information on how to lock threaded fasteners with Loctite sealant. Selection of grade is outlined and specific uses and methods of application are documented for studs, screws, nuts, and other threaded products. Techniques for sealing and soldering sleeve joints are covered, as well as formulas for torque determination. American Sealants Co.

169 Rubber Compound — Del synthetic rubber compound, a building sealant based on liquid polymers, is described in this 8-pp bulletin. Typical uses of the compound are listed and instructions for using it are provided. Also covered in bulletin are Delseal plastic tapes and compounds for glazing and sealing applications. David E. Long Corp.

170 Liquid Polymer — This 8-pp booklet concerns LP-31 which has highest molecular weight of company's liquid polymers. Provides data on properties, processing and compounding of this liquid polymer suited for use in sealing buildings, machine components, other applications. Stresses greater hardness, modulus and tensile strength with good elongation of converted LP-31. Thiokol Chemical Corp.



A typical Nepcoduct installation at Ford Motor Company's Dearborn Engineering Center. A type "H" system is installed for the main feeder run. Standard Nepcoduct is used for secondary runs in conjunction with the new type "H" duct. Junction boxes are designed to accommodate both standard and large size ducts.

Architects: Voorhees, Walker, Smith & Smith, N.Y.
Electrical Contractor: Hall Engineering, Detroit

FORD standardizes on larger capacity underfloor raceways for main feeder runs . . .

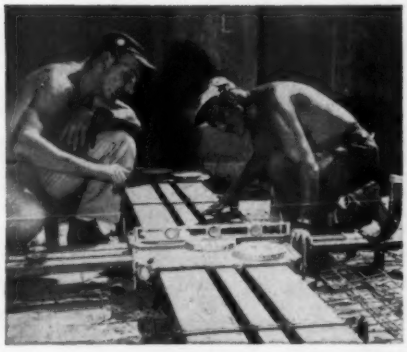
New National Electric "H" System used in Dearborn Engineering Center and Rawsonville office buildings

A type "H" system, the latest addition to National Electric's standard Nepcoduct Underfloor Raceway line, has been specified by Ford Motor Company. It will provide full electrical distribution throughout floor areas at the new Dearborn Engineering Center and Rawsonville Office Buildings.

Type "H" Nepcoduct, with a cross section of 1⅜" x 6⅜", has increased capacity to accommodate the large size cable feeds required to serve modern power and telephone facilities. It is especially suited to the growing electrical needs of network teletype, data processing and extensive communication equipment.

All Nepcoduct components including type "H" can be installed as a one, two or three duct system with large hand hole openings in junction units to provide easy access to power, light and communications systems. Adaptable to any type of floor construction, Nepcoduct makes outlets available wherever they are needed for efficient office layout. Electrical service changes can be made quickly and at low cost to the owner or tenant . . . without interrupting business routine.

When you build, specify NE Nepcoduct to be sure the building will never grow old electrically. Write for complete information today.



Quick and economical to install, Nepcoduct provides separate wiring facilities for light, power, inter-communication and telephone. Streamlined service fittings less than three inches high are provided with standard receptacles of 15 to 50 amperes capacity and with bushed openings for telephone and intercom use.

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BULLETINS

(Begins on page 21)

OTHER EQUIPMENT

171 The Wire Story — This 72-pp illustrated catalog describes company's line of wire for industrial applications. Gives complete ordering specifications for all wire, including low carbon coarse wire, high carbon fine and specialty wire, low carbon fine and specialty wire, and flat and shaped wire. Includes diagrams and descriptions of the various types and grades of wire. The Colorado Fuel and Iron Corp.

172 Computer Bibliography — For those interested in learning more about the absorbing subject of digital computers, an annotated bibliography of computer literature is offered in this 48-pp publication. The bibliography has been prepared with emphasis on scientific and engineering use of computers. Remington Rand.

173 Airless Blast Cleaning Rooms—Catalog 142-D, 12-pp, contains detailed descriptions of airless blast cleaning rooms, varying in size from one capable of handling a six-ton railroad diesel engine weldment to one with a 100 ton capacity used for cleaning castings. Wheelabrator Corp.

174 On Cathodic Protection — This 16-pp handbook covers fundamentals, applications and economics of cathodic protection. Among subjects treated are field measurements, condensers and heat exchangers, underground pipe lines, marine equipment protection. The Dow Chemical Co.

175 Bearing Manual — Included in the 88-pp 15th edition of company's general catalog and engineering manual is a section correlating anti-friction Bearing Manufacturers Ass'n terminology with company's designs. Other sections deal with selection of ball thrust bearings; calculating thrust load capacities for any speed; effect of parallelism and flatness; fits and tolerances, formulas for calculating thrust loads for gear drives; oil and grease lubrication methods; grease selection guide; and handling of bearings. Aetna Ball & Roller Bearing Co.

176 Working for Profit — Improved methods that cut costs and advanced equipment that suggests ideas for new products are presented in this pocket-size 32-pp booklet. It is divided into sections by industry. On-the-job illustrations show how company's cranes, handling systems, Trackmobile, processing equipment and other products are contributing economy and efficiency. Whiting Corp.

177 Industrial Hose Reels — This 16-pp catalog describes company's line of hose reels for industrial applications. Completely illustrated with photos and cutaway views, it provides detailed information on design and construction features, and contains tabulated specifications. Standard reels described include those for handling of liquids and gases, cable reels, storage reels. Clifford B. Hannay & Son, Inc.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 275-276.

PUMPS, COMPRESSORS

301 Continuous Flow Pump — Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes specifications. Robbins & Myers, Inc.

302 General Purpose Pumps — Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

303 Industrial Pumps — A number of different types of industrial pumps for a variety of applications are illustrated and described in this pamphlet. Size and capacity data are listed for each type. C. H. Wheeler Mfg. Co.

304 Circulating Pump — Bulletin 1A-856 details seven advantages of company's Booster circulating pumps, and includes complete design and performance information. A capacity chart and specifications included. Bell & Gossett Co.

305 Solids Handling—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

306 Industrial Compressors — Bulletin SSB-56 covers company's complete line of industrial air compressors from the ½ hp to 150 hp, including the accessories that go to make a complete installation. Photos of the various models are included, as well as specifications and dimensions. Schramm, Inc.

307 Gas-Engine Driven Compressors —A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Clark Bros. Co.

308 Industrial Air Compressors — Twelve-pp Bulletin A-43 describes company's vertical design industrial air compressors supplying moderate amounts of air on a continuous 24-hr heavy-duty basis. Design features are described and illustrated by means of a cutaway view, and specifications and dimensions are tabulated. Joy Mfg. Co.

309 Turbo-Compressors — Bulletin 126-A, 12-pp, describes company's turbo-compressors which are designed to deliver constant pressure at all loads. Advantages are detailed, design and applications described, and pressure ratings of turbo-compressors shown. The Spencer Turbine Co.

310 Air Cooled Compressors—Bulletin AC-15, 16-pp, shows a complete line of small, air-cooled compressors for industrial, and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are given and two charts—one for figuring compressor needs and another showing estimated air consumption for 30 shop jobs—included. Gardner-Denver Co.

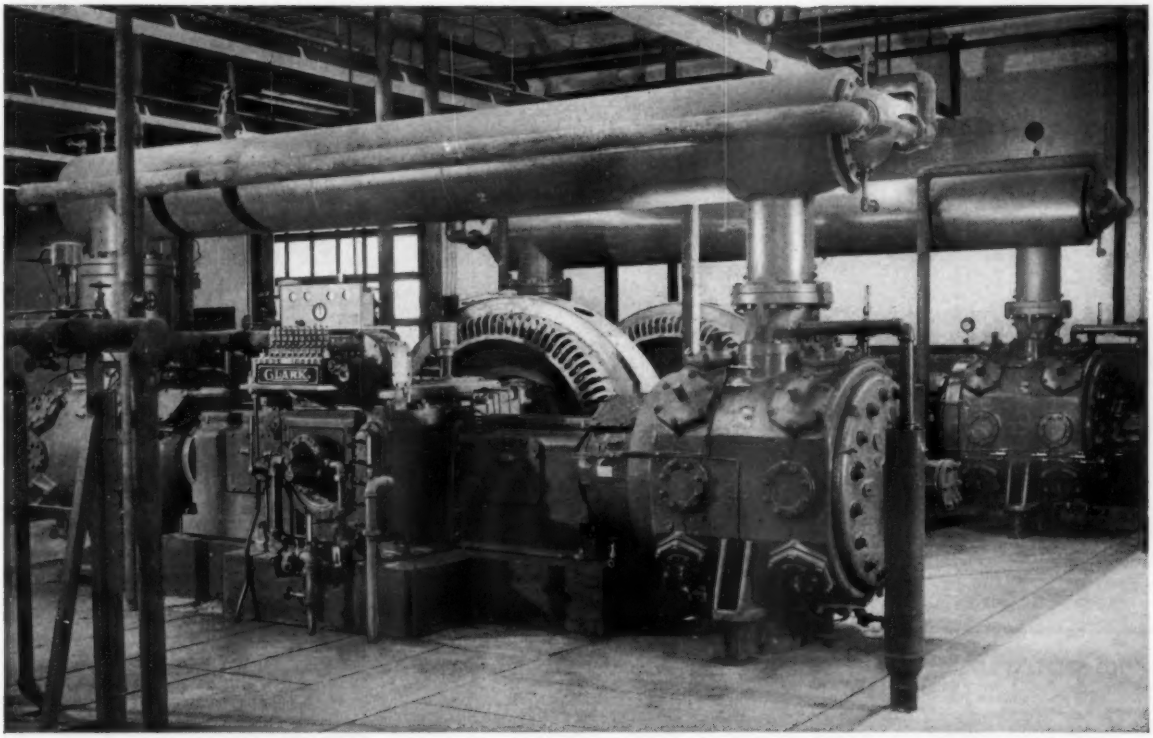
311 Portable Compressors—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines. Le Roi Div., Westinghouse Air Brake Co.

312 For On-the-Spot Air—Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

PACKINGS, GASKETS, SEALS

314 Teflon Products — Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP522 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

315 Improved Packings — Advantages of company's Chevron packings for rams, plungers and reciprocating rods are illustrated and described in 8-pp Catalog AD-115. Tables show general recommendations for packings against various pressures, approximate depths. The Garlock Packing Co.



What Jules Verne couldn't foresee!

Around the world, 24,325 miles of it, in 45 hours and 19 minutes... our strategic B-52 bombers did it non-stop! This speedy trip made Jules Verne's "80 days" seem like a lifetime. Part of the B-52 – the electrical pneumatic units that drive generators to provide the muscle for operating flaps, gun turrets, radar and countless other operations are provided by Thompson Products, Inc. of Cleveland, Ohio. Four of these 205 horsepower units go into every B-52. To be certain they are perfect, Thompson gives them a thorough test before shipment. One 350 horsepower Clark CMA-4 and two Clark 600 horsepower CRA-2 air compressors furnish the air for testing.

There is a vibrationless Clark balanced/opposed compressor for practically every requirement. Sizes range up to 6000 horsepower. Your nearest Clark representative has all the facts.

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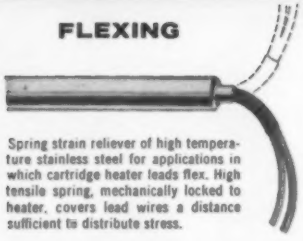
Special Chromalox features solve 3 spot heating problems

FLEXING

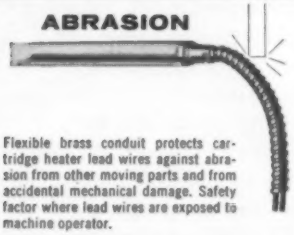


Spring strain reliever of high temperature stainless steel for applications in which cartridge heater leads flex. High tensile spring, mechanically locked to heater, covers lead wires a distance sufficient to distribute stress.

MOISTURE

Moisture-resistant flexible brass conduit protects lead wires of cartridge heaters operating in presence of steam, water, oil and vapors. Also offers added protection from flexing, vibration and mechanical damage.

ABRASION



Flexible brass conduit protects cartridge heater lead wires against abrasion from other moving parts and from accidental mechanical damage. Safety factor where lead wires are exposed to machine operator.

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DATA FILE

(Begins on page 280)

MECHANICAL POWER TRANSMISSION

317 Fluid Drive — Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1-through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables given for direct connected and V-belt types. American Blower Corp.

318 Helical Gear Drives—A new line of in-line helical gear drives is described in 16-pp Book 2651. Load classes for over 250 applications, overhung load ratings and dimension tables, instructions for proper selection and cut-away views of drives are given. Link-Belt Co.

319 Internally Geared Power—Featuring latest design improvements in gearmotors and embodying 60 multicolor illustrations, 16-pp Form F-1880 shows comparative advantages of gearmotors, lists ratings from ⅓ to 30 hp with gear ratios as high as 10:1. Cross-sectional details and enlargements of outstanding features are included. U. S. Electrical Motors Inc.

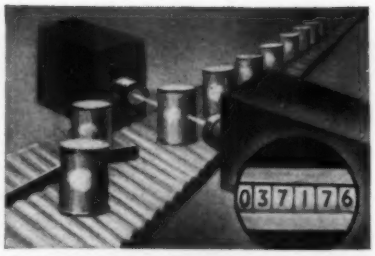
320 Chains, Sprockets—Catalog 757, 68-pp, on company's stock roller chains and sprockets, stresses advantages gained through use of roller chain and pictures some typical roller chain drives. Tells how to select a stock roller chain drive. Provides specifications, ratings, prices and engineering data required for ordering. Book is generously illustrated with photos and drawings. Diamond Chain Co., Inc.

321 Magnetic Drives — Data on design, drive features, opening and performance curves, output torque ratingdimensions, selection chart, as well as photos of installations and applications are included in 6-pp Bulletin W-T 1-57 Whitney Chain Co.

322 Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are detailed. Thomas Flexible Coupling Co.

323 Spacer Coupling—Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. The Falk Corp.

324 Dihedral Couplings — Eight-pp Catalog 62 features complete working data on sizes, capacities and dimensions of company's Series D-100 standard, floating shaft and mill motor type dihedral couplings designed to handle angular and offset misalignment up to



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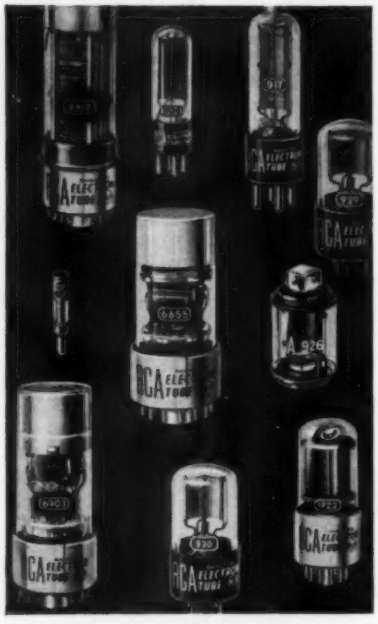

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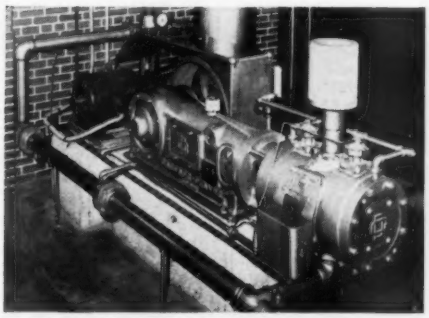
TUBES FOR INDUSTRY

Radio Corporation of America

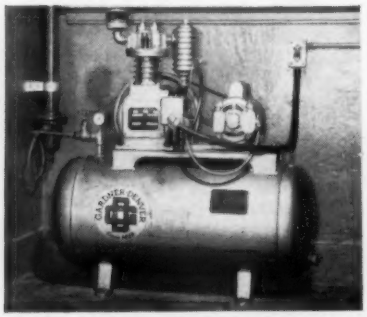
Tube Division Harrison, N. J.

OIL... fine in its place but not in your product!

End your search for an oil-free air supply. These Gardner-Denver compressors deliver it in abundance, without special filters. Self-lubricating carbon in piston, piston rings and other parts eliminates the need for oil in the air cylinder. Air is delivered clean—free from oil vapor and other foreign matter.



Gardner-Denver CRX carbon piston compressor. Delivers low-cost, oil-free air around the clock. There is no need for two separate air systems; the CRX meets air demands with minimum maintenance. Sizes from 89 to 1292 c.f.m.



New Gardner-Denver CACB tank-mounted outfit. A small, space-saving, oil-free air producer. Supplies 4 to 5 cubic feet of air per minute. Suitable for discharge pressures of 40 to 100 p.s.i.

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Westinghouse Air Compressors mean money in your pocket

If you use compressed air in your plant...

and who doesn't? . . . it will pay you dollars and cents to investigate the many advantages of installing Westinghouse Air Compressors. Here's why:

- *Pressurized lubrication*
- *Positive low oil level protection*
- *Thermal overload protection*
- *One year guarantee*

In sizes from ½ to 15 hp, Westinghouse compressors can be inexpensively installed around your plant at multiple points of service. If you need a heavy-duty compressor for continuous service rely on Westinghouse air.

W-108

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Westinghouse
Air Brake Co.
Milwaukee 1, Wisconsin
Distributors in all principal cities

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DATA FILE

(Begins on page 280)

a total of 12 deg. Photos and dimensional drawings provided. Ajax Flexible Coupling Co., Inc.

325 V-Belt Economy — Disadvantages of makeshift and other ill-advised means of coping with stretched or broken V-belts are discussed briefly in this folder. Answers questions on V-belt maintenance, inventory, wear. The Manheim Mfg. & Belting Co.

326 What's In a V-Belt?—Informative little 16-pp Booklet S-51105 describes raw materials used in producing V-belts. Natural and synthetic rubbers, cotton and synthetic cords, rubber chemicals and steel cables used in company's line are subjects for explanations of each material's role in the final product. Goodyear Tire & Rubber Co.

327 Cylindrical Roller Bearings — Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. Typical installations are illustrated. SKF Industries, Inc.

328 Motor-Clutch-Brake Unit—Package motor-clutch-brake units for automatic cycling are featured in this illustrated bulletin. Design and operation advantages are fully detailed, and cross-sectional diagrams are used to illustrate component features. Specification table is included. Erricsson-Merritt, Inc.

329 Power Transmission Machinery — Bulletin A-646A, 8 pp, contains data on company's power transmission machinery, including sheaves, sprockets, bushings, conveyor pulleys, couplings, speed reducers, clutches, bearings, takeups, V-belts, collars, and steel transmission pulleys. One page is devoted to Flexidyne, a dry fluid drive and its advantages. Dodge Mfg. Co.

330 Power Transmission Equipment —Form 1200, 12 pp, describes a full line of conservatively rated equipment for various power transmission requirements, including flexible couplings, variable speed pulleys, variable speed belts and sheaves, variable speed transmissions, motor bases, and universal joints. Dimensions and capacities given. Lovejoy Flexible Coupling Co.

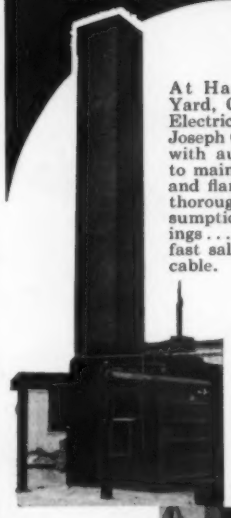
VIBRATION CONTROL

332 Improved Machine Mounts — This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, lessen noise. Barry Controls, Inc.

333 Vibration Control Specifications —Bulletin F-2C shows how to write vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treat-

HOW JOSEPH GODER INCINERATOR and "CINCINNATI GAS" Salvage 2000 lbs. of Copper Wire and Cable Per Hr.

At Hartwell Salvage Yard, Cincinnati Gas & Electric Co. installed a Joseph Goder Incinerator with automatic controls to maintain temperature and flame protection for thorough, "no odor" consumption of rubber coatings . . . for the profitable, fast salvage of wire and cable.



Especially designed with tandem charging doors for in-line batch charging direct from storage area.

A quick push starts 2000 lbs. of copper cable on its 1-hour salvage trip.

Bright, clean blaze strips coatings, leaves smokeless pile of copper salvage.

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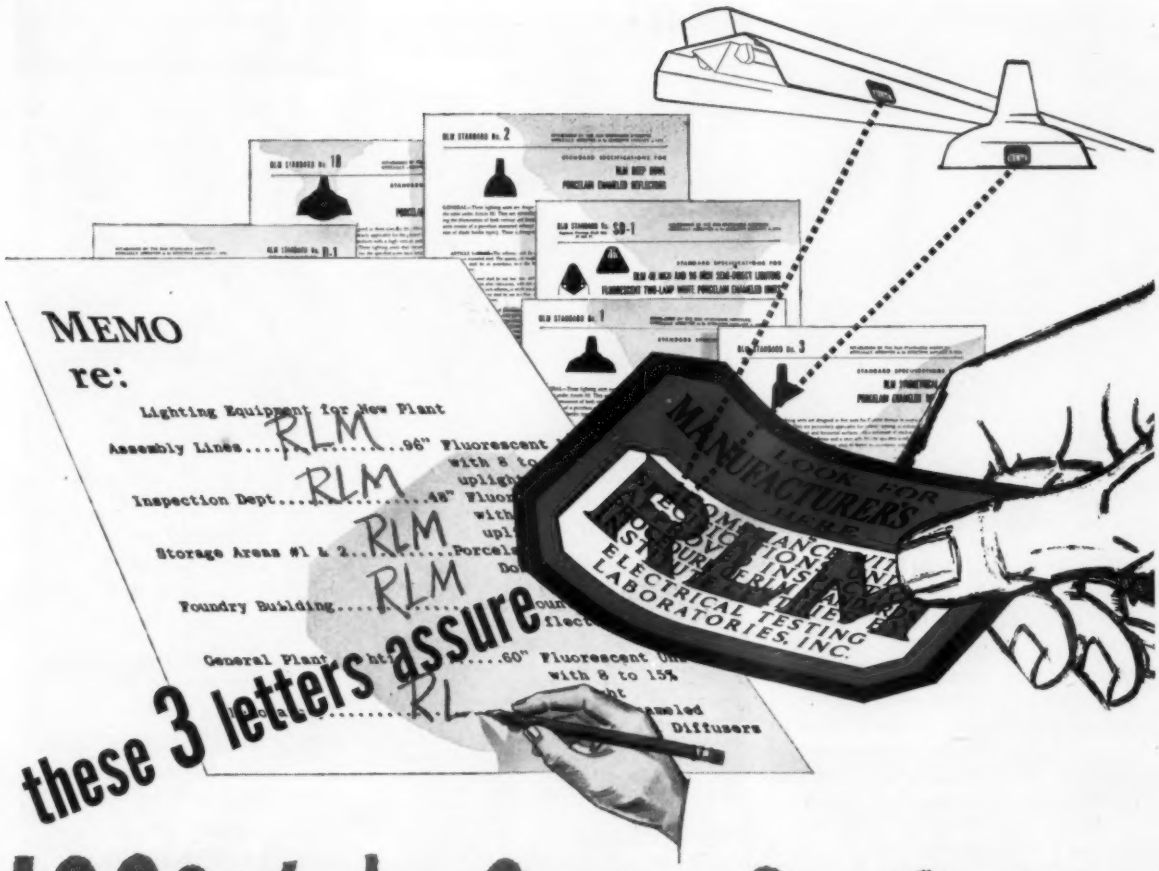

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With the addition of just three letters, RLM, you assure lighting units that meet the highest RLM Specifications in history. The many advantages of these specifications are yours on the ten incandescent and fluorescent units most widely used in modern industrial lighting. For each of these ten units, it takes a special RLM Specification of over 1,000 words to cover the minimum RLM quality standards for materials, construction, design, photometric performance, etc.

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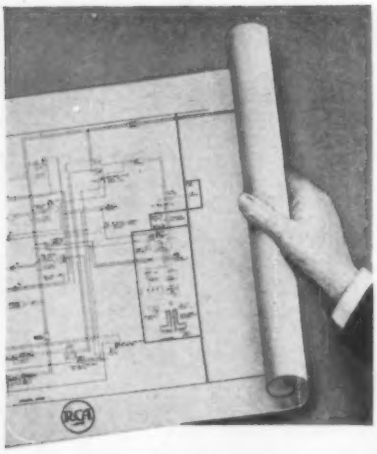

ONE GOOD RCA SOUND SYSTEM LEADS TO ANOTHER AT OWENS-ILLINOIS

Outstanding performance by an RCA Sound System at Owens-Illinois Glass Company in Gas City, Indiana, led to one conclusion. An RCA system was approved without hesitation when facilities were renovated. Plant Personnel Director W. W. Coleman points out that a major factor in the decision was that the original RCA System proved its dependability over a long period. He heartily recommends RCA Sound for industrial applications.

Owens-Illinois' RCA Sound System carries a complete daily music program to every building. Personnel paging can reach the entire plant or selected areas. The system is set up for split-second emergency communication. The dual-channel installation has three microphone inputs, six rack-mounted amplifiers and 78 12-inch speakers.

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DATA FILE

(Begins on page 280)

ment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

HEATING, VENTILATING

335 Plumbing, Heating Supplies — Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

336 On Unit Heaters — Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories. American Air Filter Co., Inc.

337 Revolving Unit Heaters — Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included. L. J. Wing Mfg. Co.

338 Unit Heaters — Catalog 157, 32 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors, and heat transfer coefficients. Piping and installation are illustrated. Modine Mfg. Co.

339 Industrial Ovens — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers. The W. W. Sly Mfg. Co.

340 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheather electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages. Edwin L. Wiegand Co.

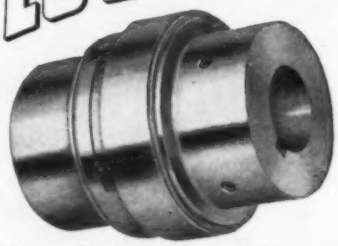
342 Roof Ventilators — Sixteen-pp, Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data are included. Hartzell Propeller Fan Co.

343 Ventilation Units—Bulletin FM-315, 25 pp, describes basic construction of company's package propeller fans for commercial and industrial applica-

15 YEARS SERVICE WITH ONE SET OF CUSHIONS

... actual report on

LOVEJOY



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Up to fifteen years maintenance-free service is not unusual with Lovejoy lubrication-free flexible couplings.

Performance like this is practical proof of these soundly engineered features:

SIMPLE, RUGGED CONSTRUCTION
Fewer parts. No intricate mechanisms. Nothing to lubricate.

LOAD TRANSMITTED BY CUSHION COMPRESSION
No wear on the metal jaws.

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One half of the cushions act as idlers—except on reversible loads. A quick interchange provides a new set of cushions. This can be done without dismantling the coupling.

Illustration at right shows a Lovejoy Type CF flange-mounted coupling. Rated at 160 hp., 800 rpm., this space saver connects drive shaft between diesel power unit and generator.

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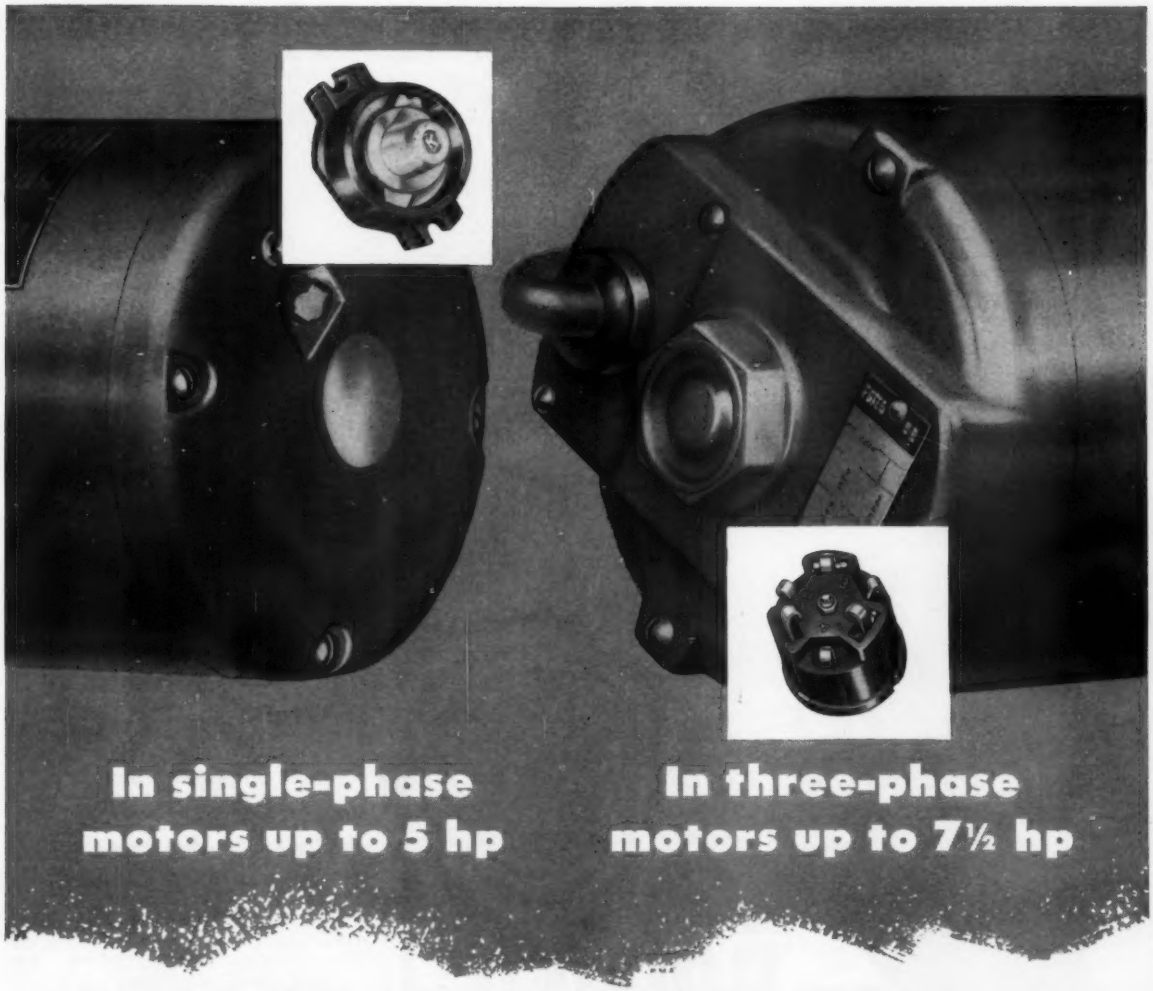

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mean maximum safe output, minimum down time

With the new Klixon Inherent Motor Protector for 3-phase motors, you now have available the same full safe capacity from polyphase motors that you have been getting for the past 20 years in single-phase motors.

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Always specify and use motors — single and polyphase — with built-in Klixon Protectors.

Remember, Klixon automatic and manual reset protectors:

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- √ SIMPLIFY MOTOR CONTROLS
- √ ASSURE MAXIMUM SAFE MOTOR CAPACITY

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Spencer Thermostat Division 4510 Forest Street, Attleboro, Mass.

KLIXON

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DATA FILE

(Begins on page 280)

tions. Illustrated case histories of typical installations are included, as well as performance data rating tables, performance charts. Buffalo Forge Co.

MAINTENANCE

345 Basic-Roofing Information — "What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

346 Roofing and Siding Data—This folder contains Bulletins 2032, 2032A, B, C and D on corrugated Asbestone roofing and siding, stud weld fasteners, staggered joint application and straight joint application. Includes specifications, as well as photos and dimensional drawings showing construction details. National Gypsum Co.

347 Insulation Coating — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's No-Drip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

348 Protective Coatings—Corrosion control in the operating plant is the subject of this bulletin, which outlines several corrosion-resistant coatings systems for buildings and equipment, structural steel, towers and columns, tanks and piping. Properties and uses are given. Amercoat Corp.

349 Painting with Aluminum — This helpful booklet describes advantages of aluminum paints, describes three basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture, and practical suggestions are given. Aluminum Company of America.

350 Improved Curing Agent—Emeri-Crete Kure, a chemical compound for curing and hardening Emeri-Crete flooring, Emeri-Topcrete and other concrete floors is introduced in this illustrated bulletin. Stresses efficiency, one-application feature and economy of the compound and includes brief test data. Walter Maguire Co., Inc.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 275 and 276.

351 Metal Cleaning, Finishing—Principles of metal cleaning are discussed in this 24-pp illustrated catalog. A variety of metal cleaning and finishing machinery is described, including conveyor type cleaning machines, monorail type cleaning machines, drum type cleaning machines, turntable type machines. The Cincinnati Cleaning & Finishing Machinery Co.

STORAGE EQUIPMENT

353 Storage Racks, Bins—Many innovations in the Sturdi-Bilt adjustable storage rack and steel bulk bin lines are described in two bulletins offered by the company. Bulletin BB-956 covers steel bulk bins, with easy-to-follow charts for planning storage needs, and diagrams demonstrating construction principle for instantaneous readjustments. Bulletin SR-956, 8 pp, covers adjustable storage racks, with specification chart, suggestions for multiple uses. Sturdi-Bilt Engineering Co.

354 Storage Equipment — Catalog 100-E, 72 pp, illustrates and describes company's complete line of steel cabinets, folding chairs, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and specifications, installation photos. Lyon Metal Products, Inc.

355 Adjustable Shelving — How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed

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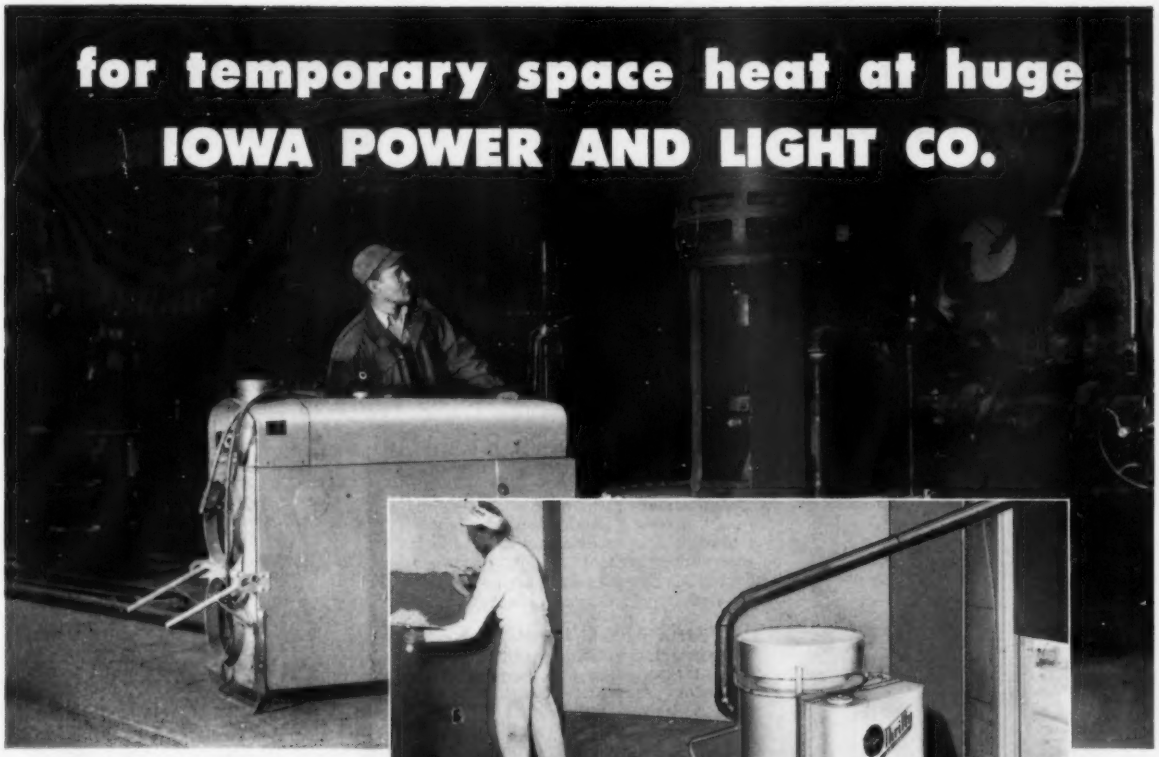

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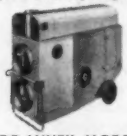
Interchangeable power plants—gasoline engine or electric motor. Gasoline or oil fired. Up to 425,000 BTU capacity.



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DATA FILE

(Begins on page 280)

shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

CONSTRUCTION

357 Aluminum Building Products — Form AD 285 is a 32-pp catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. Aluminum Co. of America.

358 Standardized Construction—This 28-pp illustrated catalog on company's system of standardization in building construction presents a description of "F" buildings, a versatile series of flat-roof structures. Luria Engineering Co.

359 Partitions and Walls—Low cost sound-absoring partitions and walls designed for movable and flexible office enclosures are featured in this illustrated bulletin. Dimensional diagrams and specifications are included, also installation photos. GR Products, Inc.

360 Panel Wall Construction—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

361 Window Modernization — How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

362 Steel Floor Plate — Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. United States Steel Corp.

363 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; fabricating. Alan Wood Steel Co.

DUST CONTROL

365 Dry-Type Filters — Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for removing airborne impurities given. Dollinger Corp.

366 Electric Precipitators—The use of electric precipitators in the recovery of fine dust particles is described in 26-pp Bulletin 104. A cutaway view of company's electric precipitator showing component features is included. Ad-

V-BELTING BY THE MILE!
Fasteners by ALLIGATOR

✓ Open-End V-Belting (in rolls) is now supplied by all major V-Belt manufacturers.

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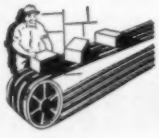
With Alligator Fastened V-Belts you can make up conveyors any width, any length.



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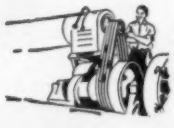

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Alligator Fasteners solve this problem!

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34 years of research uncovers new solution

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—Made of rustproof, non-corroding —MONEL, heads don't twist off or screw —slots distort. They are easy to remove —when necessary, can be used over and —over.

—Used with NEW 'Sexauer' EASY-TITE —faucet washers, this combination out- —lasts past faucet repairs "6 to 1"! —EASY-TITES are made of super-tough, —pliable du Pont compound (neither rub- —ber nor fiber) and reinforced, like a —tire, with a vulcanized layer of Fiber- —glas, they resist distortion and splitting —from shut-off grind and squeeze.

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Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, STOPPING just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS—LABOR—and *costly* FIXTURE REPLACEMENTS!

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WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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DATA FILE

(Begins on page 280)

vantages of the electric precipitation system are detailed, also installation procedure. Buell Engineering Co.

367 Industrial Dust Control—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

369 Portable Electric Tools — This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. The Black & Decker Mfg. Co.

370 Pipe Tool Ordering Guide—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs etc. Armstrong Bros. Tool Co.

371 Pipe Tools — Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, price data included. The Ridge Tool Co.

372 Portable Tools — Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metalworking industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection. Skil Corp.

373 Where to Use Your Stud Driver —Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

374 Handy Fastening Tool — Two booklets show different ways in which this fastening tool can be used. One booklet shows how the tool can be used for plant maintenance—fastening conduits, bus ducts, junction and outlet boxes, surface raceways, fixtures and frames, duct straps, fan and blower mounts, sprinkler pipes, partition plates. The second booklet tells how it can be used for lead lining. Tells how to line various kinds of tanks and storage rooms. Ramset Div., Olin Mathieson Chemical Corp.

375 Industrial Tools — Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts and tables designed to aid in selection of tools. Armstrong Bros. Tool Co.

376 Electrode Guide — Catalog 1318 is a 58-pp pocket guide to electrode selection. Mechanical properties and testing of electrodes, specifications, classification and properties of electrodes, are among the data featured, and different types of electrodes are described. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

VALVES, TRAPS, PIPING AND ACCESSORIES

378 High Pressure Valves — Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. Yarnall-Waring Co.

379 Semi-Steel Valves—Bulletin V-203 Rev. 1, 44 pp, covers company's entire semi-steel valve line. A revised edition, it includes new features, including two pages of photos, drawings and detailed description of lubricants and lubricating methods, and cutaway photos showing working parts of 4 types of semi-steel valves—two-bolt cover, screwed-gland, bolted-gland, and multiport types. Meter and Valve Div., Rockwell Mfg. Co.

380 Industrial Valves — Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, check valves, proportioning valves. W. S. Rockwell Co.

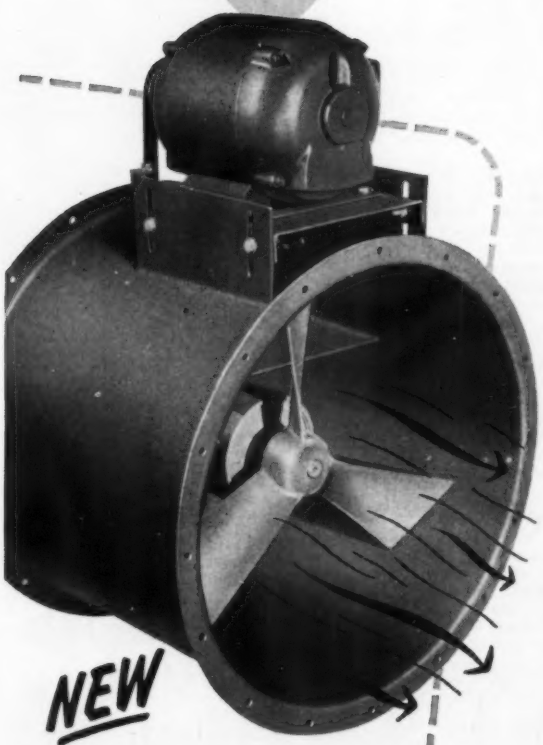
381 Corrosion-Resistant Valves — Eight-pp Bulletin 7 contains complete engineering specifications for company's corrosion-resistant valves, as well as photos of individual types in the line. Alloy Steel Products Co.

382 Plug-Type Valves — Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features. Jenkins Bros.

383 PVC Valves, Fittings—This 16-pp bulletin describes polyvinyl chloride valves and fittings offering resistance to most salts, alkalis and acids. Bulletin provides application tables on performance of normal impact PVC valves and fittings for handling 315 fluids. Cutaway drawing and text detail design features for long-time control of corrosives. Tables show physical properties, recommended working pressures. Walworth Co.

384 Hydraulic Control Valves—Catalog 200-7, 16 pp, describes construction features and advantages of company's

expel
FUMES, HEAT AND DUST
at LOW COST



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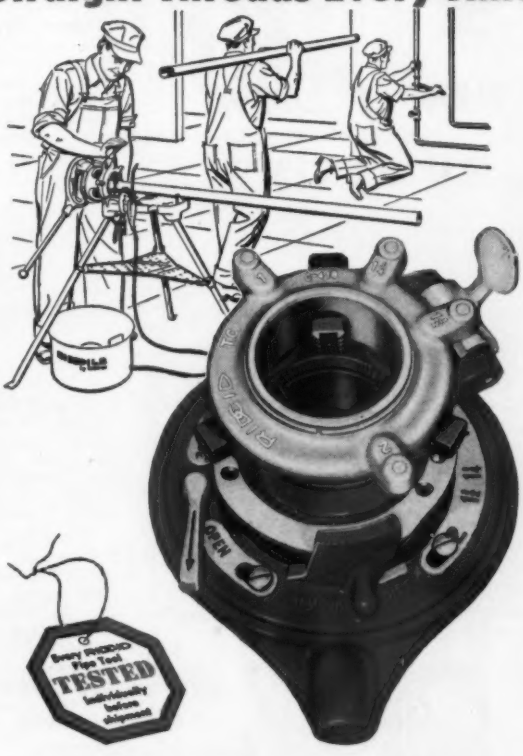

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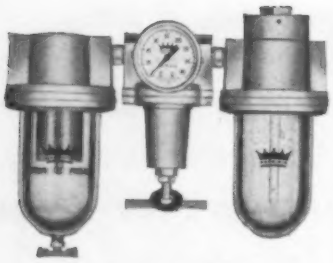

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DATA FILE

(Begins on page 280)

line of hydraulic control valves. Photos, dimensional diagrams, circuit wiring diagrams, and complete engineering data are included. Logansport Machine Co., Inc.

385 Steam Traps—Quick-Flex thermostatic steam traps for outdoor and non-freeze service are described in Bulletin 257. Itemizes typical uses for these traps. Specifications and capacities are given in tabular form, accompanied by dimensional drawings. A piping diagram shows recommended installation. The V. D. Anderson Co.

386 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps weight-operated traps. W. H. Nicholson & Co.

387 Bellows Design Guide—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Flexonics Corp.

388 Pipe for Modern Buildings — This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings. A. M. Byers Co.

389 PVC Pipe Fittings, Flanges— This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations. Grinnell Co., Inc.

390 PVC Pipe, Fittings — Bulletin PE-40, 12 pp, describes physical properties and chemical resistance of company's PVC pipe and fittings designed for process industries. Plumbing and installation data is included, as well as pipe and fitting dimensions, valve dimensions. Corning Glass Works.

391 Fittings and Tubing — Steel and zinc coated fittings and tubing are described in illustrated Bulletin SF-155. Advantages are detailed and installation diagrams are included. U. S. Hoffman Machinery Corp.

392 Swivel Joints—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on products, booklet is well illustrated. Chiksan Co.

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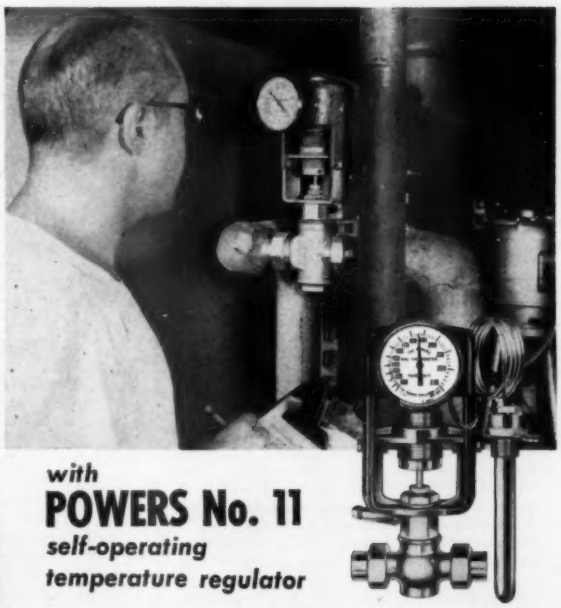

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DATA FILE

(Begins on page 280)

INSULATION

394 Glass Fiber Insulation — Among the company's products described in this illustrated bulletin are three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts are included illustrating the acoustical and thermal values of the insulating blankets. L. O. F. Glass Fibers Co.

395 Piping Insulation — Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping where maximum efficiency is of primary importance and for hot water and low pressure steam. Gustin-Bacon Mfg. Co.

396 Industrial Insulation — This 8-pp bulletin describes Alltemp, an all-temperature pipe and block insulation from 100 to 1600 F. Physical characteristics, recommended thickness data, method of application are included, with 10 advantages of this insulation. The Philip Carey Mfg. Co.

ELECTRICAL

398 Totally-Enclosed Motors — Bulletin 500-A describes company's totally-enclosed, fan-cooled motors in ratings from ½ to 40 hp. Ratings and dimensions listed. Robbins & Meyers, Inc.

399 Motors and Transformers—This 8-pp bulletin contains detailed information on company's electric motors and dry-type transformers. Rating and dimension data are presented in convenient tabulated form, and all illustrative detail, including photos and mounting diagrams is included. Wagner Electric Corp.

400 Control Centers — Publication EL-174, 32 pp, describes company's Unitrol, a standardized motor control center. Feature's Unitrols' new concept of modular design, which presents a variety of motor controls in central structure. Generously illustrated with photos, charts and layout plans, it presents varied applications and engineering data for facilitated selection and planning. Cutler-Hammer, Inc.

401 Enclosed Switches — Catalog 83, 28 pp, and Catalog 101, 20 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

402 Switch Wiring Diagrams — Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporated more than one useful feature. Allen-Bradley Co.

403 Electrical Equipment Digest — Electrical equipment illustrated and described in 138-pp Catalog Digest 139, includes load centers, circuit breakers, low voltage control, fusible service equipment, interchangeable hubs, meter equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters, magnetic breaks, relays, contractors other equipment. Square D Co.

404 Trolley Busway Systems—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

405 For High Voltage Cable—Test results and service records on an improved butyl rubber compound for high-voltage cables are announced in 12-pp Bulletin EB-27. Covers resistance to ozone, operating temperature, high-voltage, dielectric strength, aging, insulating resistance, mechanical moisture absorption, electrical moisture absorption, capacity and power factor. Anaconda Wire & Cable Co.

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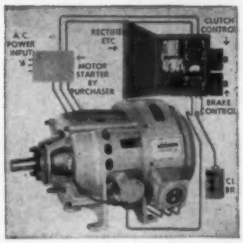

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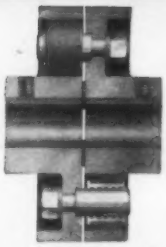

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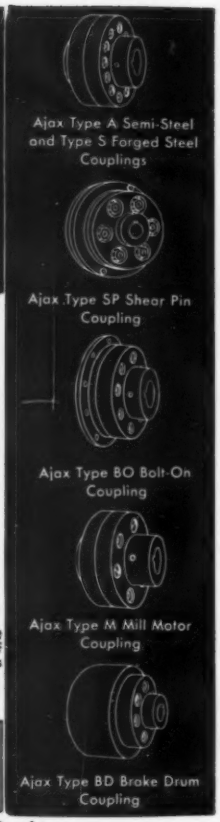
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DATA FILE

(Begins on page 280)

406 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages of the products are detailed, a table of insulations furnished, and design and construction features illustrated. The Okonite Co.

407 Wires and Cables — Interlocked armored cable, supports and fittings designed for low cost, heavy duty industrial, power or control wiring are described in this 24-pp bulletin. Photos and specific descriptions of various types of armored cables available for voltages through 15,000 v, single and multi-conductor are included. Arranged in table form are dimensional data, including conductor size, stranding, insulation, sheath and armor thickness. National Electric Products Corp.

408 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3 includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

409 Asbestos Insulation — "Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Rockbestos Products Corp.

410 Aluminum Conduit Fittings — To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Crouse-Hinds Co.

411 Handbook on Storage Batteries —This 64-pp booklet on instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks. Gould-National Batteries, Inc.

412 For Motive Power — Catalog Form 5161, 12 pp, describes advantages and illustrates component features of company's Ironclad batteries, with Silvium, designed for motive power service. Describes design of the positive plate, as well as the negative plate, the microporous separator, and other features. Exide Industrial Div., The Electric Storage Battery Co.

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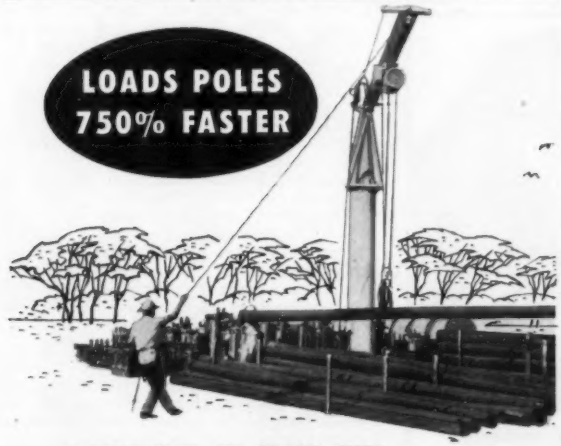

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LeTourneau Jib Crane at a southern utility company* will pay for itself in less than two years, according to its president. The installation has reduced pole loading on line trucks from 15 minutes per unit to two minutes. Crane permits easy pole sorting . . . simplifies buying and eliminates need for large stockpile. Unit also handles transformers and reels of conductor.

Full-revolving LeTourneau Jib Cranes, both manually and power-rotated, available in capacities from 3 to 15 tons. Handle rated loads anywhere on 25' boom. Can be equipped with matched LeTourneau Hoists.

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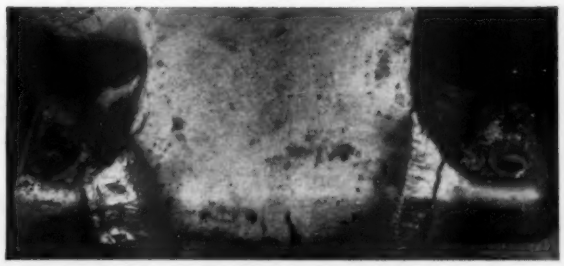

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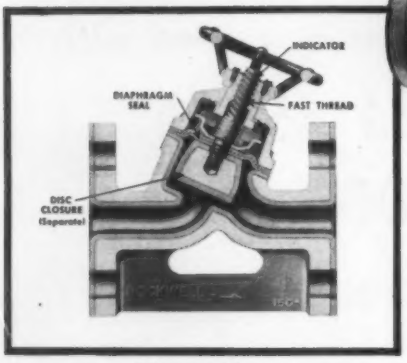

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DATA FILE

(Begins on page 280)

413 Secondary Unit Substations — Bulletin 9004-A, 20 pp, describes lower cost, complete flexibility and space saving of secondary unit substations. Photos and charts of construction are provided, also. Standard KVA ratings covering all types of indoor and outdoor substations. I-T-E Circuit Breaker Co.

LIGHTING, COMMUNICATION

415 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient installation. General Electric Co.

416 Outdoor Mercury Lighting — "How Mercury Vapor Outdoor Lighting Brings More Night Action." 8 pp, stresses low cost and versatility of mercury vapor lamps. Shows their uses in industrial areas, parking lots. Sylvania Electric Products, Inc.

417 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light. Westinghouse Electric Corp.

418 Lighting Unit Specifications — The current edition of the "RLM Standard Specifications of Industrial Lighting Units" contains important revisions in specifications on both incandescent and fluorescent units, as well as new lighting data. Of special importance are new coefficient of utilization tables for eight units. Calculations are based on latest zonal method of computing coefficients of utilization and illumination on room surfaces. RLM Standards Institute.

419 Closed-Circuit TV — This illustrated bulletin describes a closed-circuit television system for industrial and institutional use. Information pick-up, selection and control, and information display components are pictured and described, and advantages of closed-circuit television in particular installations are detailed. General Precision Laboratory Inc.

420 Inside Telephone System—"Ten Ways To Cut Costs With Inside Telephones" is a 12-pp illustrated booklet which tells how ten different organizations are saving money with P-A-X. Explains the role of this telephone system, separate from the public telephone service, in stepping up production, saving man hours, cutting costs, improving customer relations, and effecting further company benefits. Automatic Electric Sales Corp.

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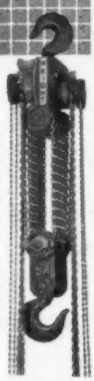

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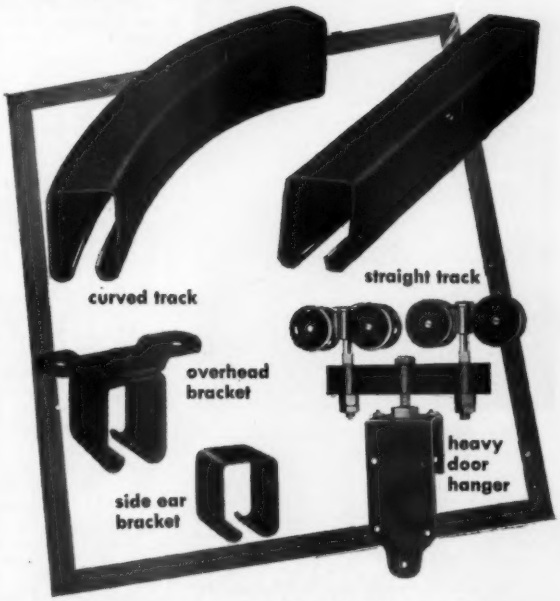

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DATA FILE

(Begins on page 280)

421 Television Equipment — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

BOILERS, GENERATORS

423 Hot Water Boilers — Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economics of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Comparison of heat content—water vs steam— is included on table, and schematic layouts are furnished. Combustion Engineering, Inc.

424 Automatic Boilers — Bulletin BE-4 describes operation and advantages of manufacturers automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction. Boiler Engineering & Supply Co., Inc.

425 Self-Contained Boilers — Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

426 Automatic Boilers — Bulletin 1245, 24 pp, details advantages of company's packaged automatic boilers which provide low-cost steam for heating and processing. Illustrations of both oil and gas fired units are included, along with details on boiler components. Orr & Sembower, Inc.

427 Standard Generators — Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster-Wheeler Corp.

LUBRICATION

428 Multi-Purpose Grease — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Socony Mobil Oil Co., Inc.

429 Lubricating Greases — Bulletin 49 features two grades of greases developed for maximum lubrication under special bearing conditions—heavy loads, shock loads, and overloads. Uses, application methods, physical properties and benefits are detailed, and specifications are included. Sun Oil Co.

430 For Better Lubrication—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

431 Lubricant Data Book—Sixteen-pp Lubriplate Data Book No. 57-1, offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under various conditions given. Lubriplate Div., Fiske Bros. Refining Co.

MATERIALS HANDLING

433 Overhead Dispatch System — Form F 192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equip-

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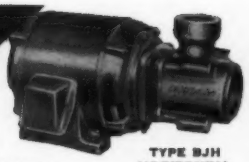

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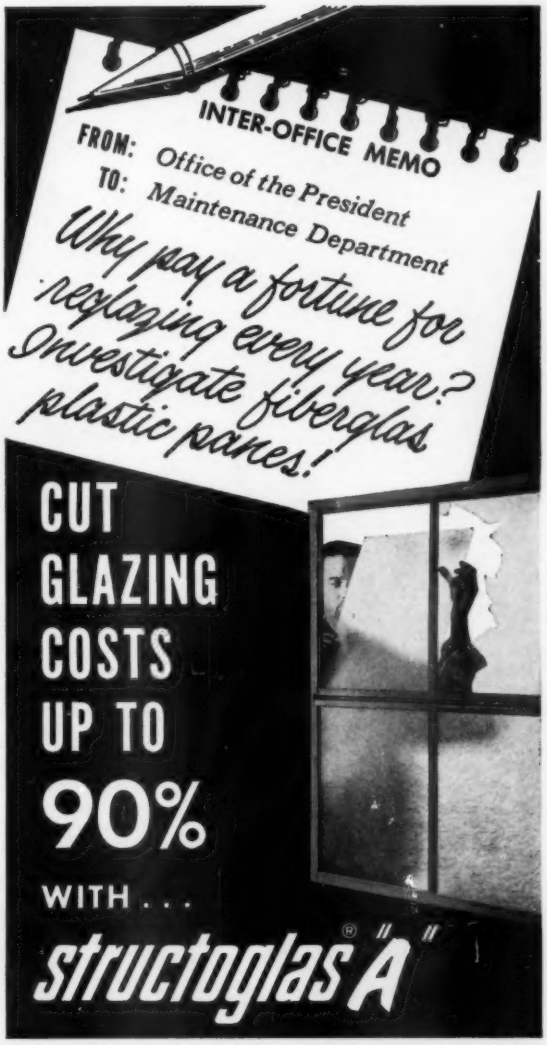
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DATA FILE

(Begins on page 280)

ment utilized in this system is described. Richards-Wilcox Mfg. Co.

434 Steel Conveyor Belts—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp builetin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

435 For Bulk Materials — Latest information on equipment for storing and handling bulk materials is contained in 12-pp Bulletin 574. Descriptions, specifications and dimensions of vertical and horizontal tanks are included. Cost savings afforded by bulk storage and handling facilites noted. The Day Co.

436 Handling Cost Cutter — Bound in loose-leaf style, the Materials Handling Cost Cutter tells how mechanized materials handling can cut handling costs in a variety of jobs and industries. Case histories of actual applications are cited, equipment and methods described, and a list of trucks and attachments "keyed" to the particular job and field. Profusely illustrated. Automatic Transportation Co.

437 Cost-Cutting Materials Handling — "The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, analysis of handling organization, collecting handling data, diagramming route of travel, and the use of equipment. The Yale & Towne Mfg. Co.

438 Chain Hoists — Catalog 61, 20 pp, describes construction and design features of company's multiple gear chain hoists, with a large cutaway view showing component parts included. A table of dimensions is given, as well as dimensional diagrams, shipping information, parts list prices and other pertinent data. Reading Crane & Hoist Corp.

439 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

441 For Materials Handling—Bulletin SE-IMH-1 describes a few of the advantages of company's machinery for handling a variety of industrial lifting and loading jobs. Illustrations of typical applications are included. Bucyrus-Erie Co.

442 Oil-Hydraulic Lifts — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank. Rotary Lift Co.

443 Sheet and Coil Lifters—Bulletin SL-30, 16 pp, illustrates and describes various types of standard and semi-special lifters for one-man or automatic handling of sheet and coil stock. Advantages and design features are detailed and tables listing dimensions included. Cullen-Friestedt Co.

444 Automatic Dockboards — Bulletin D-160 describes company's automatic dockboards for fast, safe mechanized materials handling. Features of the dockboards are illustrated and described, and general specifications included. Bulletin 181 covers specifications and layout for recessed models and package units. The Kelley Co., Inc.

445 Automatic Ramp — Power-operated, automatic-leveling dock ramps for either air-oil (air compressor) or electric operation are described in this 6-pp bulletin. Design and construction features are illustrated, and specifications are included. Globe Hoist Co.

446 Industrial Casters — Various types of casters for industrial applications are pictured and described in this large chart designed for wall mounting. Covers light duty, light-medium duty, medium duty, medium-heavy duty, heavy duty, extra heavy duty, trailer series, and special duty casters; gives selection data. Faultless Caster Corp.

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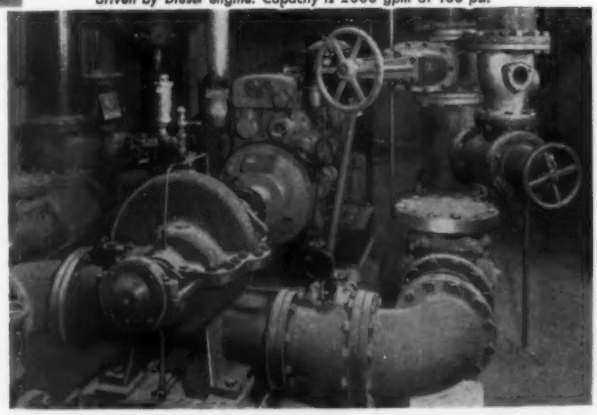

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DATA FILE

(Begins on page 280)

OTHER EQUIPMENT

447 Neoprene Design Book—This illustrated Bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures. Elastomers Div., E. I. du Pont de Nemours & Co.

448 Brinemaking Manual — Details on modern brinemaking methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system and cutaway views and diagrams are included. Morton Salt. Co.

449 Air Conditioning System — Eight-pp Bulletin 121 describes an air conditioning system which supplies fresh air with moisture removed in the summer and added in winter, under control that is maintained in "in between" seasons. Niagara Blower Co.

450 Humidification For Profit—Sixteen-pp Bulletin 500 presents data showing how relative humidity affects hygroscopic materials, health and comfort, and formation of static electricity. Schematic diagrams and sectional drawings demonstrate operation of electrically and air operated steam humidifiers. Armstrong Machine Works.

451 Magnetic Selection Guide — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets, serves as handy guide to selection. Dings Magnetic Separator Co.

452 Heat Exchanger Tubing—Cited in this 30-pp catalog are typical cases where cupro-nickel or Monel tubing installed in heat exchangers resulted in substantial savings and better efficiency through longer tube life. Describes applications of this tubing in various instances where unusual water conditions, as to pollution, excessive turbulence, temperature and the like, required such tubing. The International Nickel Co., Inc.

453 Venting Fundamentals—Tank vents, fittings and accessories for fire prevention and vapor control are described in this 34-pp illustrated bulletin, covering venting principles, operating fundamentals, fire protection, maintenance, non-conservation venting, conservation venting, storage tank filling, storage tank rodding and sampling, fuel tank filling. The Protectoseal Co.

454 Special Steels For Industry—This 232-pp ring-bound catalog is designed to show the industrial steel user at a glance the complete range of grades and sizes available from stock, describing over 700 products. Its index lists 16 categories of special purpose steels, including high speed, tool, stainless, alloy and machinery, available in 16,000 grades and sizes. Over 20 estimating, conversions and weight tables as well as other information are also included. Book is available to qualified plant engineers. Please state your job title when requesting it. Crucible Steel Co. of America.

455 Equipment Selector Charts—Bulletin CE-50, 20 pp, contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps; lined tanks. American Hard Rubber Co.

456 Incinerators—"The Incinerator Blue Book" is a 16-pp bulletin on incinerator developments, covering design features, methods of feeding and charging of refuse, waste analysis, and other information. An incinerator selection chart, classifications of incinerators, capacity and dimension data and specifications included. Joseph Goder, Inc.

457 Protective Clothing—Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves and suits and coats are featured, and protective features and advantages of this equipment are pointed out. The B. F. Goodrich Co.

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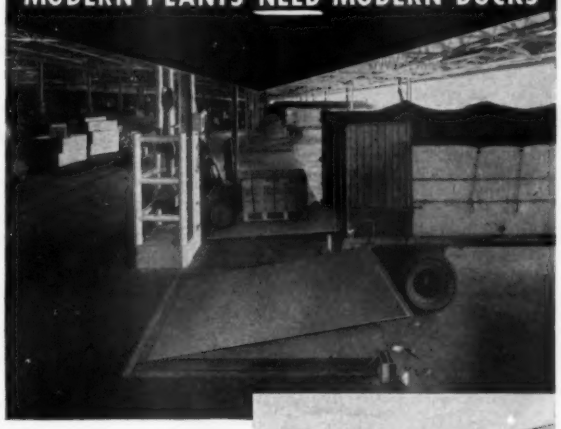

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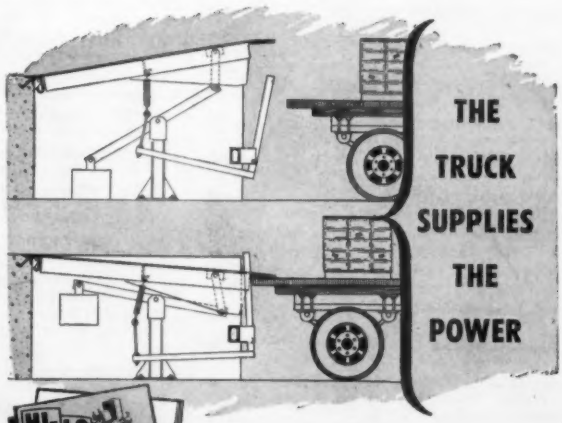

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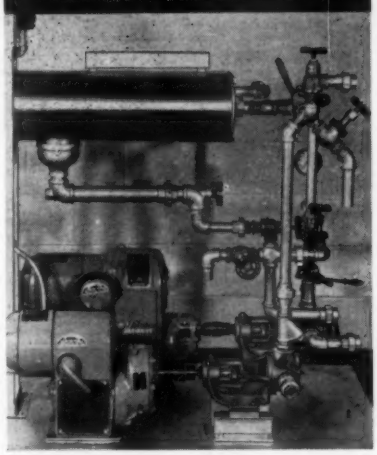

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HOFFMAN INSTALLATIONS PAY THEIR WAY AT ARMOUR & CO.

HOW HOFFCO-VEYOR SYSTEM IMPROVED PRODUCT ROUTING AT GLUE PLANT

before the installation of a money and labor-saving Hoffco-Veyor pneumatic system in this Armour & Co. glue plant, these were among their conveying problems:

1—Materials moved slowly, in uncontrolled quantities.

2—Bulky machines were used in product routing.

3—Raw materials escaped into the plant atmosphere.

4—Plant personnel was exposed to moving machinery.

5—Considerable manual labor was required to move materials between four separate processing floors.

after installation of a Hoffco-Veyor pneumatic conveying system, these improvements resulted:

1—Materials moved in controlled quantities.

2—One compact Hoffman system serves the entire plant.

3—Clean, dust-free pickup and delivery prevents leakage into plant atmosphere.

4—Working hazards were eliminated by enclosed equipment.

5—Materials move between separate processing floors automatically. Savings pay for equipment in short time.

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STAYNEW® FILTERS

Dollinger makes ALL TYPES of filters as shown on this page, plus special filters for unusual filtration problems. New users of one specific type of Staynew filters often find a second Dollinger filter performs a great, added service in other processes or operations. Perhaps we can serve major or other filtration needs of your plant.

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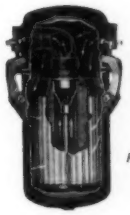
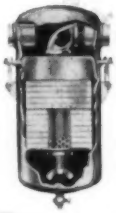


Model CVH (Vacuum)
Pipe Line Filter
Bulletin 200



Model AAPHS
(Absorption)
Pipe Line Filter
Bulletin 200

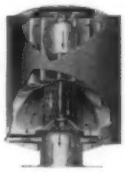
Model HPH and AHPH
(High Pressure)
Pipe Line Filter
Bulletin 200

all types of FILTERS for every INDUSTRIAL NEED

AIR INTAKE FILTERS

Model IDR
(Ground Level)
Air Intake Filter
Bulletin 100

Model DS (Silencer)
Air Intake Filter
Bulletin 100



Model D (Outdoor)
Air Intake Filter
Bulletin 100

Model C (Indoor)
Air Intake Filter
Bulletin 100

VENTILATION FILTERS

Electro-Staynew Mist Collector
Bulletin 420

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Bulletin 400

Automatic Ventilation Filter
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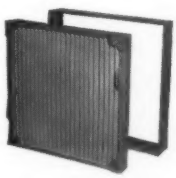

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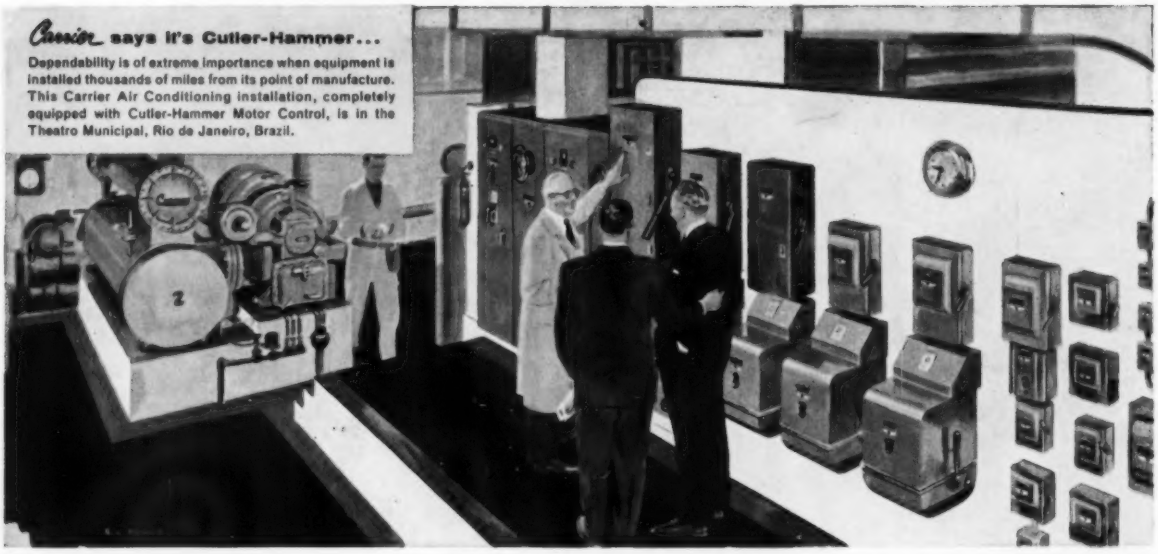
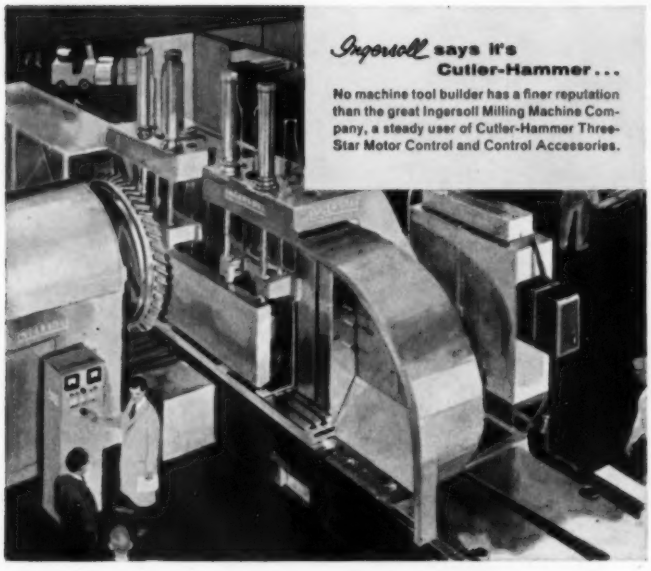
The leaders have a name for it



Carrier says it's Cutler-Hammer...

Dependability is of extreme importance when equipment is installed thousands of miles from its point of manufacture. This Carrier Air Conditioning installation, completely equipped with Cutler-Hammer Motor Control, is in the Theatro Municipal, Rio de Janeiro, Brazil.



Ingersoll says it's Cutler-Hammer...

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Black and Decker says it's Cutler-Hammer...

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Cutler-Hammer Three-Star Motor Control, the most advanced general purpose motor control, is stocked for your convenience by a nationwide network of Authorized Cutler-Hammer Distributors.

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MOTOR CONTROL
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When you seek dependable performance in the machines you build or the machines you buy, specify Cutler-Hammer Motor Control.

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Plant Engineering

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The magazine that helps plant engineers with their everyday problems

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